DECEMBER 2, 1961

Chemical Week

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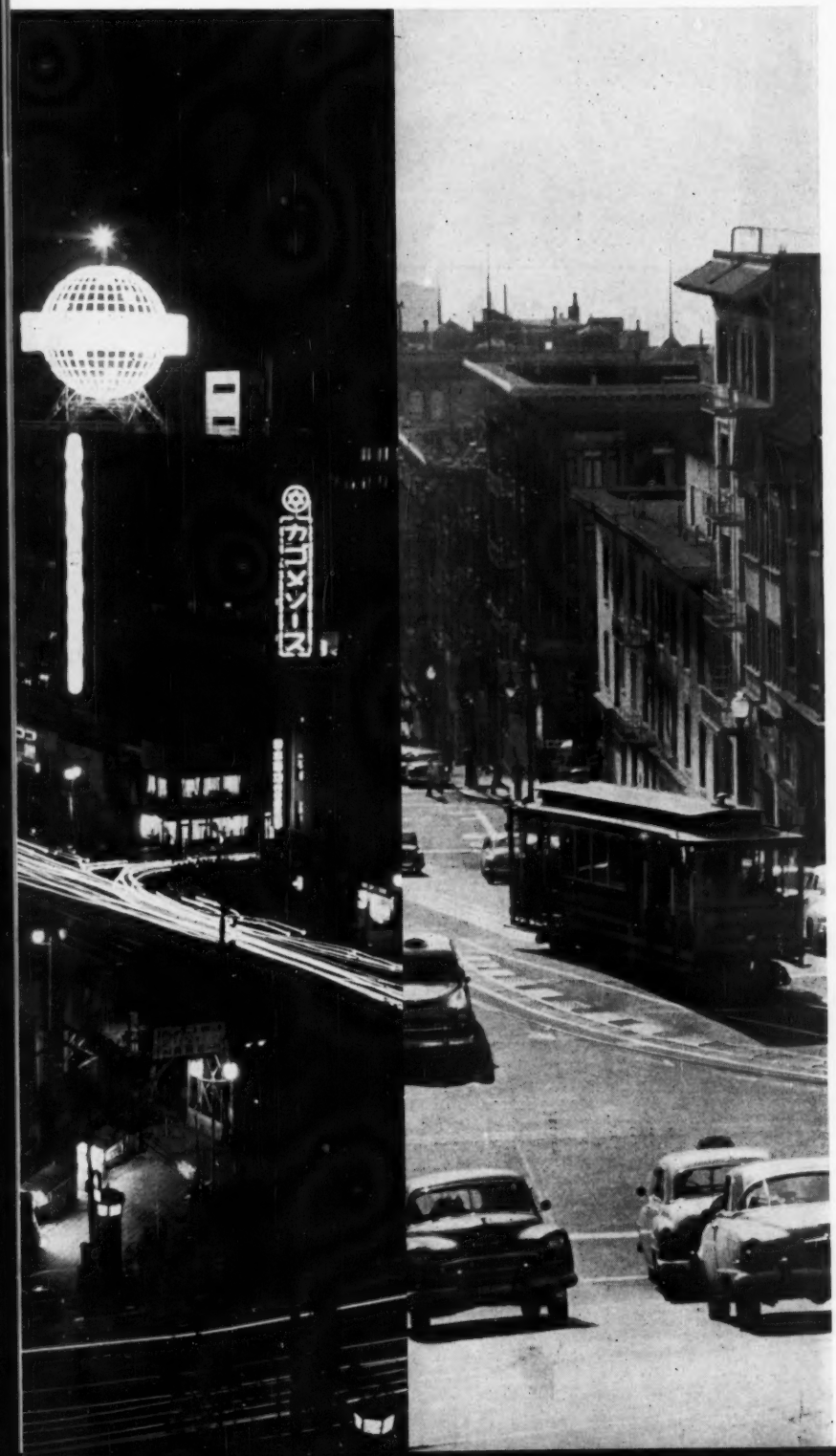

Allied goes to well; others say 'upgrade'. Aim: peak profit from petrochemicals . . p.24

Mexican turnabout: long-time fertilizer buyer becomes exporter p.35

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Maleic prospects brighten as labs close in on spate of new uses p.75

◀ **EAST MEETS WEST AT CMRA SESSION ON JAPAN** p.26

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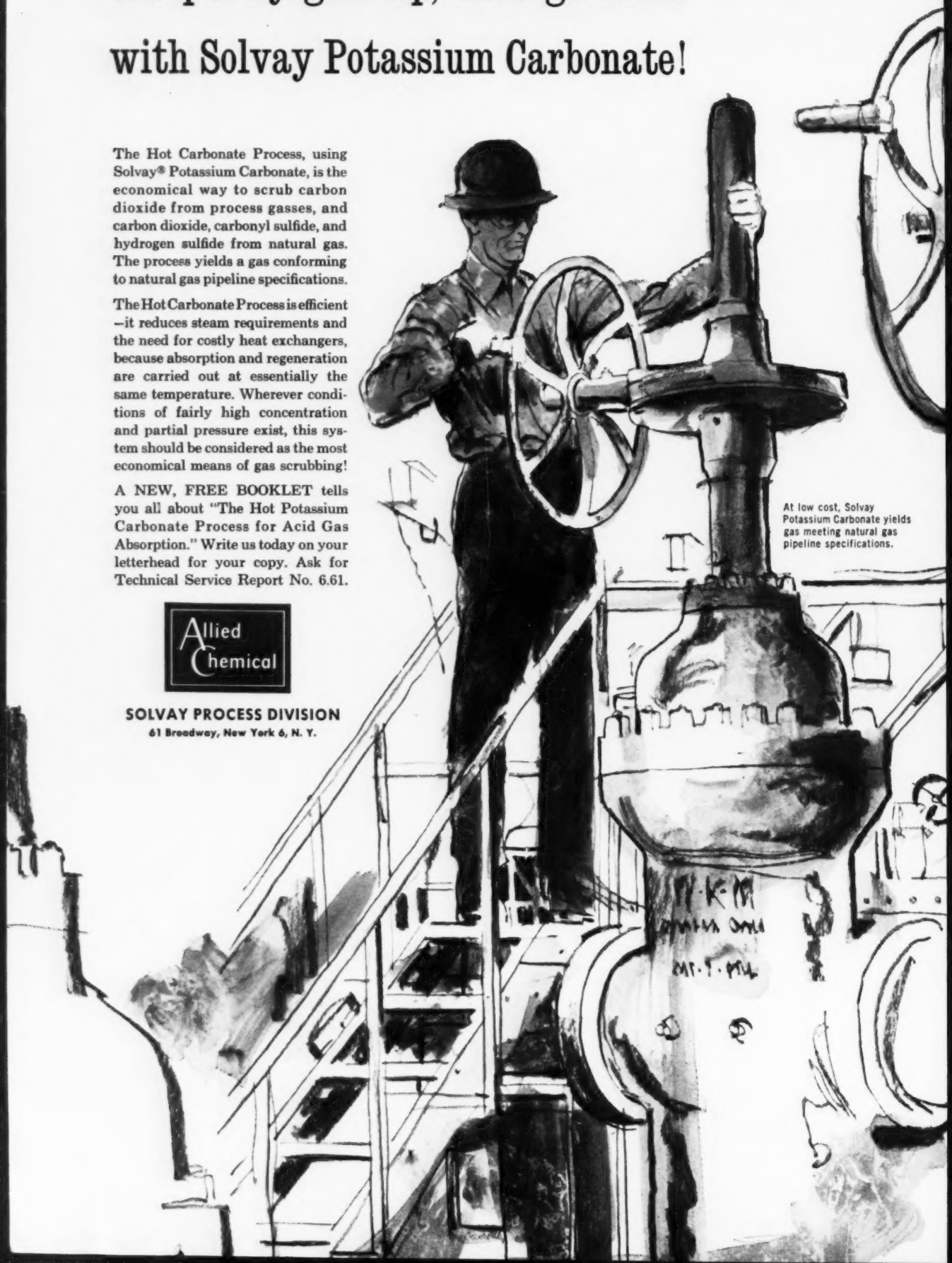

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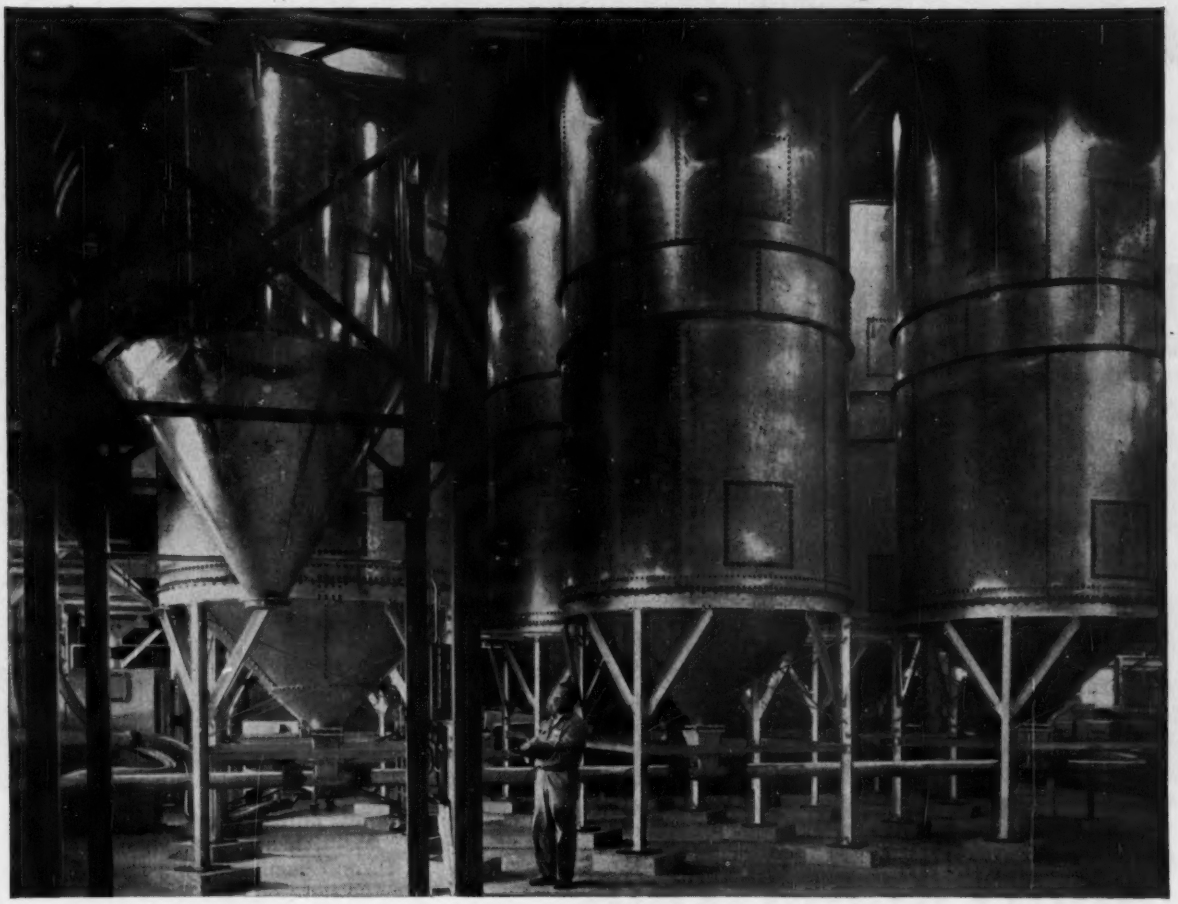

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ON THE COVER: The side-by-side photographs of Tokyo and San Francisco symbolize the impact of the Japanese CPI on world trade—on the agenda of CMRA at San Francisco (p. 26).

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Cost of Being Governed

SPEAKING to the Manufacturing Chemists' Assn. last week, MCA President John E. Hull forwent his usual review of MCA activities, concentrated instead of the high cost to industry on being governed—federally, by the states, and by local communities.

During the last session of Congress, 14,000 bills were introduced; 401 became law and many are still pending. At least 83 of those passed and pending are of direct significance to the chemical industry. In the various state legislatures, 801 measures affecting industry were reported on; 312 became law.

"The local level was not left out," continued General Hull. "For example, there were several occasions when questions arose in connection with plastics. Either local legislative controls, or possibly a discriminatory ruling (made, as in one case, by a local fire marshal because he did not have the full facts), have added unspecified and probably unmeasurable amounts to the cost of doing business."

One company, Hull cited, has a technical man devoting his full time to relationships with one government agency concerning its products. Counting his salary, other people's time, travel expenses and intangibles, the company estimates that he costs it nearly $100,000/year. "It should be noted that this man is not required by the law or the agency involved. However, the company deemed him necessary in this duty to enable it to understand the law."

Another example is the "due process" of law required to clear polyethylene as a packaging material for foods. The estimated cost to industry of assembling and presenting to the Food & Drug Administration the scientific data upon which a ruling could be made was $1 million.

Other items:

- It cost one company about $250,000 to assemble and present data to the Federal Housing Administration on a product for use in construction.
- No one has estimated the cost to industry of the new hazardous-substances labeling law, but FDA's first-year budget for administering it is $800,000.
- To check compliance with the Walsh-Healey Act, the Dept. of Labor plans to add 300 inspectors and five safety men to its present force of 600 inspectors.

"Like it or not," Hull quoted Westinghouse President Mark Cresap as saying, "businessmen must accept the fact that government influence in our economy is not likely to decline. The best interest of all concerned calls for business and government alike to try to work constructively within the new framework."

Hull made it clear that he was talking neither for nor against government controls; he was simply citing their influence on every businessman's actions and their cost to his company.

"It seems to me," concluded Hull, "that the only logical plan for industry to follow—especially the chemical industry—is to participate more in every phase of our national life, on the municipal level, on the state level, and on the national level. We should exert a constructive leadership in each area to the best of our collective abilities."

The key word in General Hull's conclusion, it seems to us, is *constructive*. Too often businessmen—no less than labor leaders, farmers, doctors and other groups—have been so obviously blinded to the general welfare by their own self-interest that their words have rung false. This can be more damaging than silence.

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LETTERS

Swedish Dynamite

To the Editor: [Re] the following paragraph (*CW, Oct. 7, p. 111*): "The Swedes and Norwegians have already made the switch to the nitrate in underground mining and have almost completely replaced dynamite."

There are only two consumers of explosives in Sweden who use ammonium nitrate/fuel oil regularly in underground mining; and of their total consumption, 20% consists of AN mixtures while 80% is dynamites. The use of AN/fuel oil in Sweden to date is very small, less than 10% of the explosives consumption.

Torsten Edlund
President
Nitroglycerin Aktiebolaget
Gyttorp, Sweden

To the Editor: Your article on the gain of ammonium nitrate in industrial explosives (*Oct. 7, p. 111*) is interesting but incorrectly implies that TNT can be used as a detonator.

Since proper detonation is extremely important in AN-oil blasting agents and since we produce one of the best detonators, the Saf-T-Boost Primer, I would like to point out that TNT is not a satisfactory detonator for AN-oil.

R. A. Cooley
Executive Vice-President
Research and Development
Propellex Chemical Division
Chromalloy Corp.
Edwardsville, Ill.

Staley's Amylose

To the Editor: Your article "New Face in the Film Field" (*Oct. 21, p. 51*) is mistaken on two counts as far as A. E. Staley Manufacturing Co. is concerned.

First, we have never worked with the Dutch process for separating amylose from starch; our process, for which we have patent applications on file both here and abroad, is quite different from, and we believe distinctly superior to, the Avebe process.

Second, we have not yet published any projected selling price of Staley's amylose in volume, as the development is still in the research pilot-plant stage. The 12-15¢/lb. price you quoted is, in our opinion, much too low for the foreseeable future.

J. A. Bralley
Vice-President
Research and Development
A. E. Staley Manufacturing Co.
Decatur, Ill.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 West 42nd St., New York 36, N.Y.

MEETINGS

American Institute of Chemical Engineers, 54th annual meeting, Hotel Commodore, New York City, Dec. 2-6.

Eastern Joint Computer Conference, Sheraton-Park Hotel, Washington, D.C., Dec. 3-7.

Chemical Specialties Manufacturers Assn., 48th annual meeting, Hotel Roosevelt, New York City, Dec. 4-6.

National Petroleum Refiners Assn., computer conference for refiners, Hotel Tulsa, Tulsa, Okla., Dec. 5-6.

National Assn. of Manufacturers, 66th annual Congress of American Industry, Waldorf-Astoria Hotel, New York City, Dec. 6-8.

American Institute of Mining, Metallurgical and Petroleum Engineers, Iron & Steel Division, 19th annual electric furnace conference, Penn-Sheraton Hotel, Pittsburgh, Pa., Dec. 6-8.

Society of the Plastics Industry, ninth plastic film, sheeting and coated-fabric conference, Pierre Hotel, New York City, Dec. 7-8.

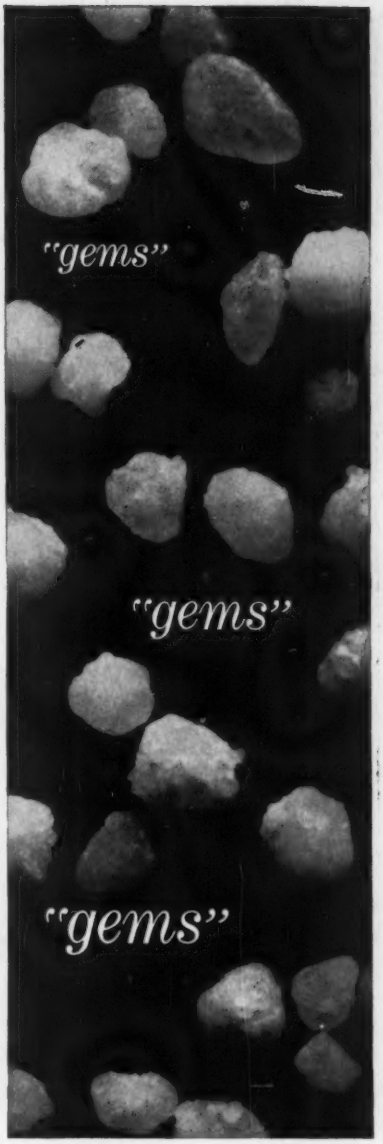
American Chemical Society, combined regional meeting, Jung Hotel, New Orleans, Dec. 7-9.

Synthetic Organic Chemical Manufacturers Assn., annual meeting and dinner, Hotel Roosevelt, New York City, Dec. 7.

Pharmaceutical Manufacturers Assn., Eastern regional meeting, Waldorf-Astoria Hotel, New York City, Dec. 11-13.

Weed Society of America, meeting, Jefferson Hotel, St. Louis, Mo., Dec. 11-14.

American Society for Quality Control, American Institute of Electrical Engineers, Electronic Industries Assn., national symposium; theme: "Reliability and Quality Control," Statler-Hilton Hotel, Washington, D.C., Jan. 9-11.



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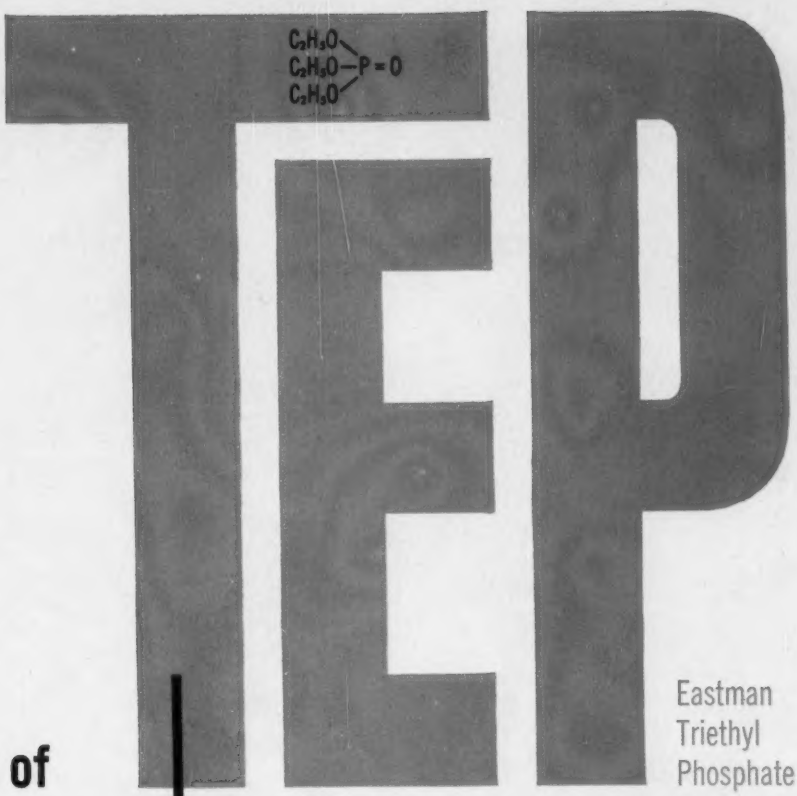

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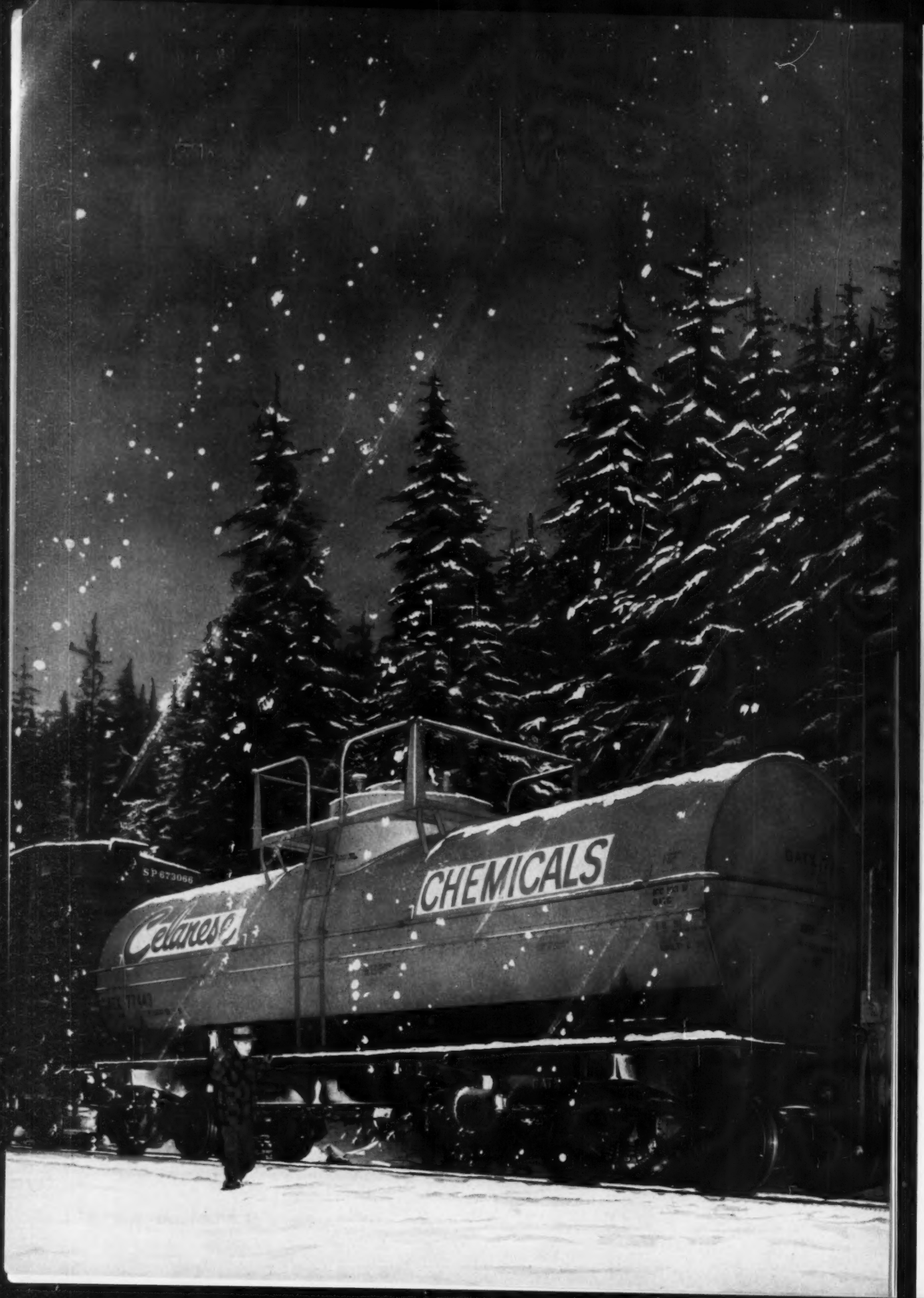
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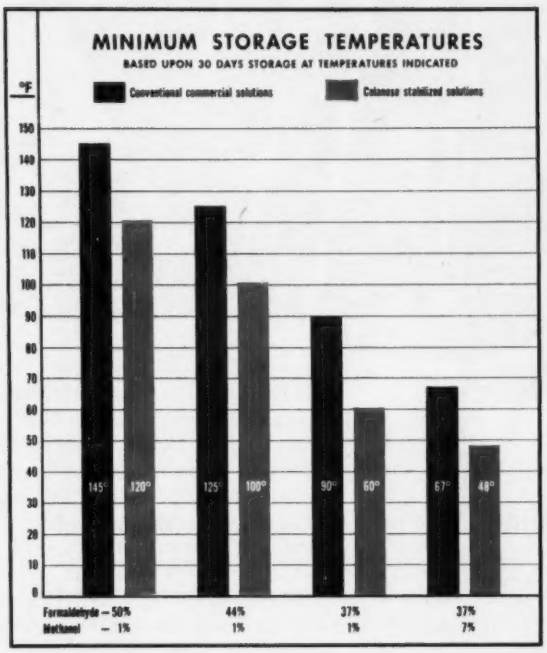

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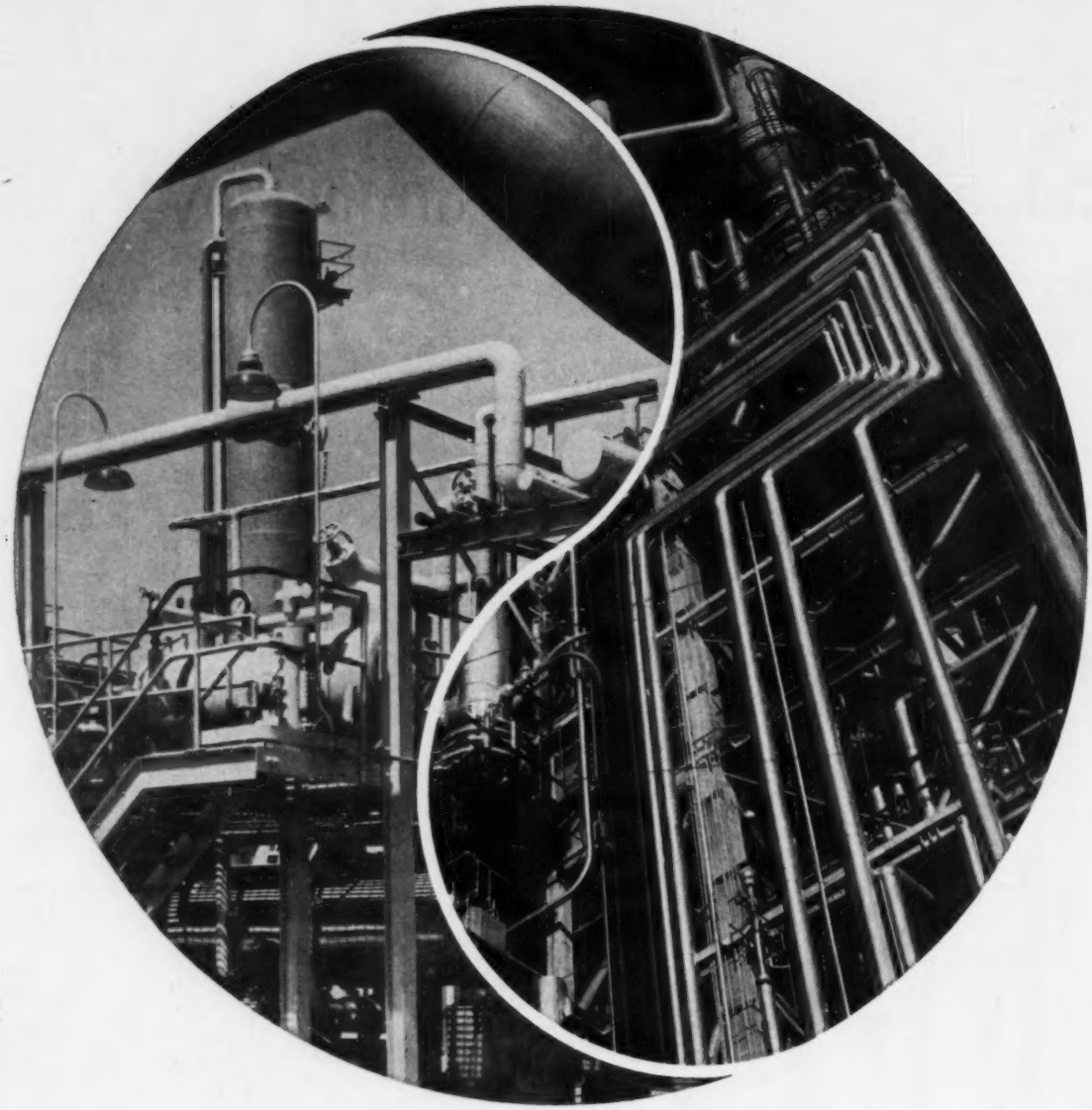

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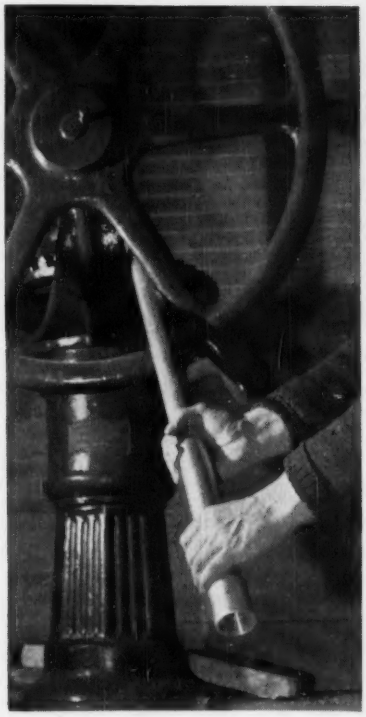
BRIEFS

A task for Fluorolube®
A better chlorine carrier
About lauryl mercaptan



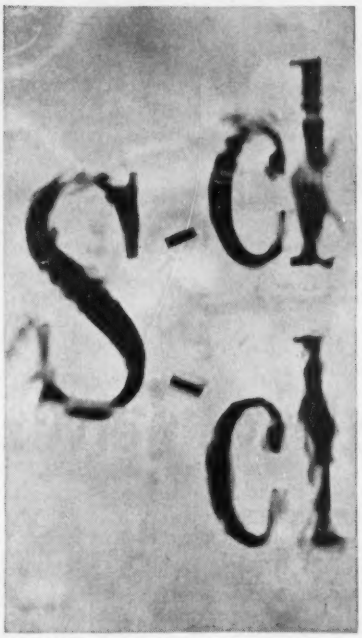
Here, obviously, is a valve that's begging for a shot of lubricant. One that's impervious to oxidants or corrosive liquids. This narrows the field to a very special kind of lubricant: the Fluorolubes (addition polymers of trifluorovinyl chloride).

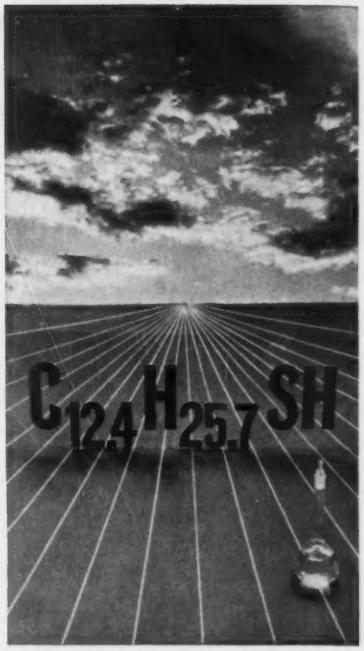
We use them ourselves on chlorine valves, and find them very good indeed. With old-style lubricants, we had to repack these valves 35 to 50 times a year. With Fluorolube packing, we do it only four or five. Of course the most spectacular uses for Fluorolubes are found in rocketry, where they are applied as coatings and lubricants for parts of missiles in contact with oxygen. They're heat-stable, too. Up to 400° F. We have some literature on Fluorolubes you can get by checking the coupon.

IF YOU WANT REACTIVE CHLORINE ATOMS

A good way to inject chlorine atoms into certain compounds is to use Hooker sulfur dichloride. Examples: chloridizing agent in metallurgy; reagent in manufacture of rubber cements and insecticides; hardener for printing inks.

Since we're in the chlorine business, our background on how to deal with chlorine atoms in usual as well as unusual ways is quite broad. Write us if you have questions—or, if you wish technical information, just check the coupon.





LAURYL MERCAPTAN, A CHEMICAL FOR IDEA MEN

Here is an interesting Hooker product used primarily as a polymerization modifier in the manufacture of "hot type" synthetic rubber. To the imaginative researcher this mercaptan may conjure up some fresh ideas in polymer chemistry. For research samples, please write on your business letterhead. For technical data sheet, check and mail the coupon below.

Typical properties

ANALYSIS:	
mercaptan sulfur	14.7-14.8%
chlorine	0.2%
LAST CRYSTAL POINT	-7°C
BOILING RANGE AT 5 MM (first drop to 95%)	108-139°C
FLASH POINT	128°C
FIRE POINT	139°C
REFRACTIVE INDEX, $n20/D$	1.4582
SPECIFIC GRAVITY AT 15.5°C	0.849

For more information, check here and mail with name, title and company address:

- ☐ Fluorolubes, Data File
- ☐ Sulfur Dichloride, Data Sheet
- ☐ Lauryl Mercaptan, Data Sheet

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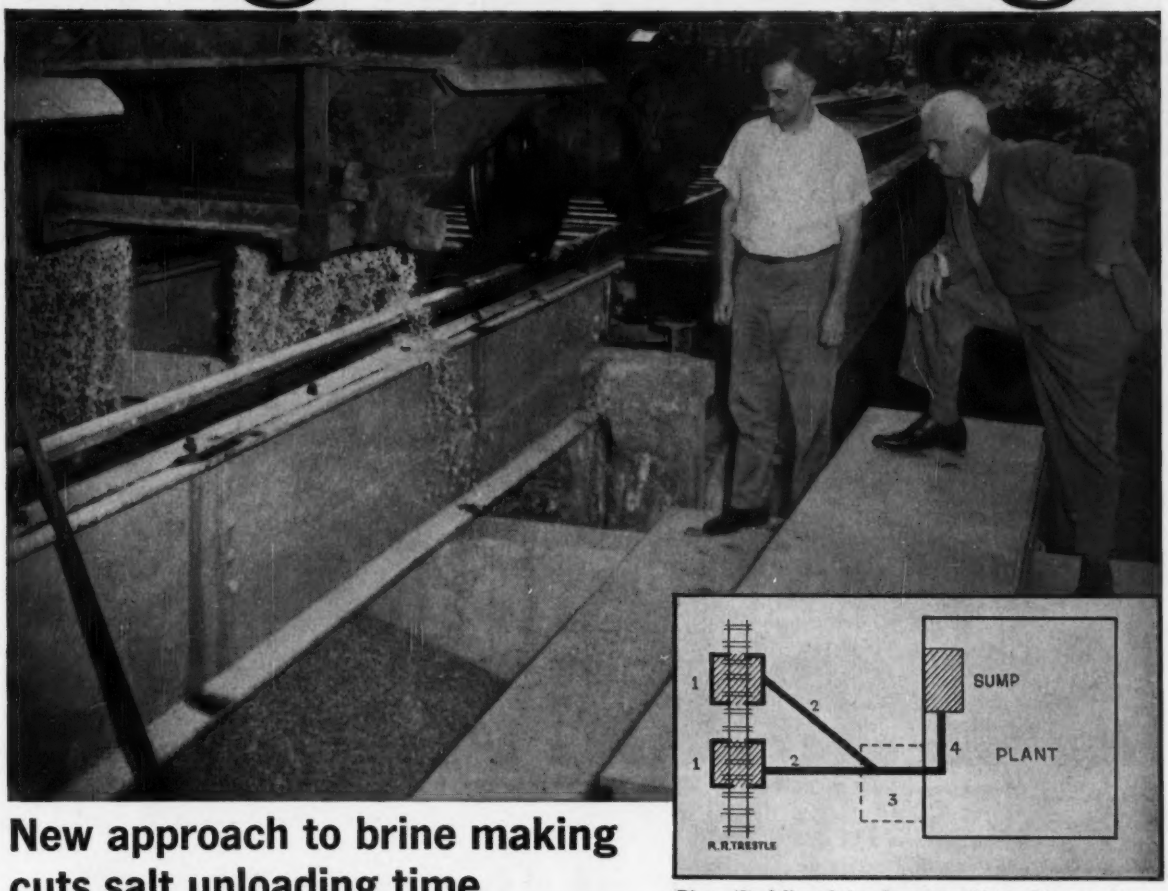
salt engineering



Pipes (2) deliver brine from new 55-ton Lixators (1) to existing pipe line (4) that served old Lixator (3). New construction made maximum use of existing installation—did not affect railroad trestle or plant interior.

New approach to brine making cuts salt unloading time 32 man-hours per car

At this N. J. plant Sterling Rock Salt used to be unloaded manually into a chute feeding a brine tank located ten feet from the tracks. Cost of the operation: an expensive 32 man-hours per car. Furthermore, the 60-ton brine tank had to be exhausted down to ten tons before another 50-ton carload of salt could be added, creating problems of reserve and scheduling.

An International Salt Company Technical Service representative and the plant manager solved the situation by installing two 55-ton Sterling Storage Lixators under the existing railroad trestle. Salt drops directly from the hopper cars into them. Gravity supplies the labor, releasing the 32 man-hours. And when the Lixators* get down to 30 tons each, a 50-ton carload tops them off with 25 tons apiece. Ordering is simplified, and the buyer never has to worry about reserve. And how does the salt get to points of use? Simple. The Lixators produce crystal-clear, fully saturated brine *automatically*. Pipes carry it into the plant.

Local contractors competed for the job by sealed bids estimated from complete plans supervised by International's Technical Service Department.

This project is a good example of how International salt engineering can benefit salt users. If you're interested in unequaled technical assistance on any phase of salt handling, storage or dissolving, write International Salt Company, Clarks Summit, Pa., or nearest district office.

*Registered T.M. International Salt Company

BOSTON CHARLOTTE CINCINNATI NEWARK NEW YORK PITTSBURGH
BUFFALO CHICAGO DETROIT NEW ORLEANS PHILADELPHIA ST. LOUIS

INTERNATIONAL STERLING SALT SALT COMPANY

"A STEP AHEAD IN SALT TECHNOLOGY"

Armour idea chemicals at work

Photograph courtesy of the Tivoli Brewing Co., Denver, Colo. (Information supplied by consultant, The Larsen Kilpatrick Co., Denver, Colo.)

Less foam at the brewery

Like many other processes, beer making needs a cooling device...a heat exchanger. And with it comes the usual bother: you have to clean away scale that forms on the galvanized piping.

The old answer was hydrochloric acid. But hydrochloric brings its own problem: foaming. It's a nuisance to work with. More, it tends to eat away the zinc coating—then the pipe is open to corrosion.

Both troubles are banished by an Armour idea chemical...*Armohib®* 28. Adding 0.1% Armohib 28 to 5% acetic acid, not only holds foam in check—it lays a protective film on the zinc. The scale comes off, but the zinc remains.

Perhaps *you* have a use for an Armohib corrosion inhibitor. They are equally effective in pickling operations...de-liming boiler lines ...cleaning refinery equipment... acidizing oil wells. In the processing of mild steels, stainless steel, monel metal and bronze, Armohib compounds block the corrosive action of hydrochloric, sulfuric, sulfamic, phosphoric and citric acids.

There is scarcely a business that cannot find ideas—and profits—in the long list of Armour chemicals-for-industry. For the Armohib bulletin, or further information on other Armour Idea Chemicals (fatty acids and derivatives), write today to Dept. CW-1.

Armour Industrial Chemical Company

One of the Armour Chemical Industries • 110 North Wacker Drive, Chicago 6, Illinois

SUPAIRCO TYPE N

High purity automatic package nitrogen plants N_2

producing nitrogen by low temperature distillation of air

Typical automatic control panel

NITROGEN

99.999%

INERT · PURE · DRY

Impurities:
Oxygen — less than 10 ppm
Water — less than 2 ppm
Argon — approximately 1000 ppm

SUPAIRCO Type N nitrogen plants* are automatic, low pressure, package type units available in sizes from 3000 scfh to 100,000 scfh.

These plants are a reliable and economical source of maximum purity (99.999%) nitrogen. With this equipment you can *eliminate* costly product rejections, *lower* operating costs, and *reduce* quality control procedures. For more information, write to:

SUPERIOR AIR PRODUCTS COMPANY

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**Manufactured under licence from Petrocarbon Developments, Ltd., London*

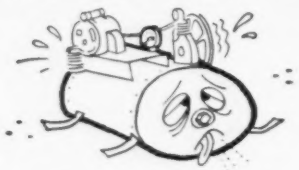
ONE OF A SERIES OF CHATS ABOUT THE CONSERVATION AND CONTROL OF HEAT

SARCO TOPICS

PREVENTION OF CRUELTY TO OLD COMPRESSORS

You've got at least one air compressor, of course. Doesn't everybody? And there it sits, pumping its heart out for you year in and year out. And you there, Simon Legree, do you ever give it a break and measure its capacity?

One measure is the useful work done by your compressed air tools, of course. However, this yard stick may make your compressor installation seem way oversize, but don't blame the equipment. The puffing oldster isn't responsible for choked intake filters, poorly designed suction pipes,



overcooling, undercooling, inadequate distribution mains and wet air. All these things can cost you.

Off and on we're going to talk about compressors in these pages, if you don't mind. It's a big subject and the lesson for today will be confined to the air intake. Can you imagine a more logical place to start?

Where to locate the intake? Easy. Where the atmosphere is clean and cool and dry. Dirty air and grit choke filters and eventually get through to cause wear. The cooler the air, the more you can compress per revolution. You'll get 10% more air delivered at 40°F. than at 90°F. And dryness is imperative, because compressed air can't contain all the moisture it can hold in its uncompressed state. Where does the moisture go? Into mains, tools, and valves, unless it's removed. And need we add that chemical fumes cause corrosion? That includes exhaust gases from engines and furnaces. CO_2 in the presence of oxygen and moisture can rust your valves, tools, nozzles and sprays.

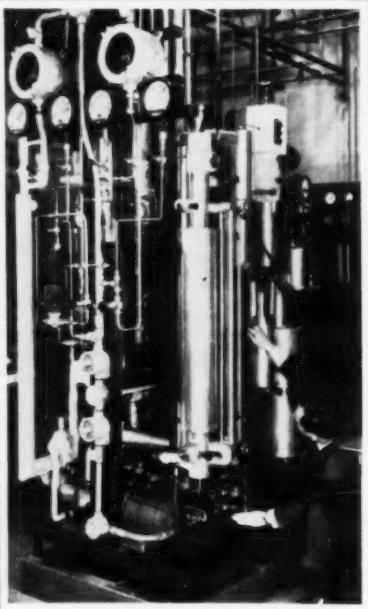
How about intake size? Keep pipes short, sized right, and straight as possible. Small pipes with snaky bends reduce pressure and capacity. For an educated example, a pressure loss due to friction in the intake pipe and filter of 2 psi (14.7 to 12.7) will reduce output of a 125 psi compressor by 7.5%.

How do we know so much? Well, as we continue in future issues, we'll be talking drains and traps and cooling and safety controls for compressors—all of which we manufacture. That's how we know so much. If you can't bear to wait, just write. It's that easy to get information out of us.

SARCO AND THE FLYING DUTCHMAN

In the pipe shop of a major office building complex on New York's east side, the Flying Dutchman flies again. This is really a bright idea which could well become standard practice elsewhere, because it's the kind of logical precaution that would make sense anywhere.

The chap in our photograph is putting together, according to precise, dimensioned drawings, an assembly consisting of a Sarco Thermo-Dynamic Steam Trap, Type TD-50, a Sarco strainer, and valves and fittings for stock. The assemblies will be used for quick and easy replacement in the event of failure or any possible maintenance requirement in the steam distribution system, the heating system, or the air conditioning system.



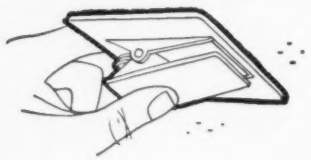
WORLD'S LARGEST ESPRESSO MACHINE?

No indeedy. It's a pilot plant Hydrofiner unit built by The Lummus Company at its Engineering Development Center in Newark, New Jersey. And its presence here is due to the fifteen ⅜" Sarco Thermo-Dynamic Steam Traps which vent and drain its 35 pound tracer lines plus a ½" TD-50 as a main drip. Nice to be picked for projects like this. Makes us proud.

We'd like to be able to report that this plan recently saved thousands of people from freezing or roasting during a crisis. So far, however, the assemblies have proved to be an ornamental kind of insurance policy. Alas, there have been no failures. That dog-goned Sarco performance is just too reliable for its own good.

WE'VE GOT THINGS TO GIVE AWAY

First of all, we have a new spring clip to hold together a bunch of papers on your desk, or something. It's not complicated, but it *is* difficult to describe, so we've gone to the tremendous expense of having our local Michaelangelo sketch it here. If you have no papers to hold together, it makes a rather delightful snapping noise that might amuse you. Oh yes—it also has a cross section of a TD-50 steam trap printed on it which actually *moves* when you wiggle your eyeballs at it. In case you *still* don't know how a TD-50 works, this is for you.



Second, we've still got engineers' sketch pads which we enjoy giving away so much we're offering them again. In case you're new here (Hello!) they contain isometric grid paper for use by anyone involved in piping or hookup sketches for process or heating applications.

And the famous Sarco key chain, which is really exactly that—a chain—about 60 times as handy as a fat case, we're offering again too. This has a TD-50 replica attached, but detachable. Call it tawdry promotion if you will, but our super-aesthetic wife wears one proudly around her neck.

All of these are available from your Sarco representative. Or, if he's out, write in.

There's really no reason to keep this conversation one-sided. After all, we're both interested in these subjects or you wouldn't have read this far. So write, even if it's only about a difficult problem. 7826

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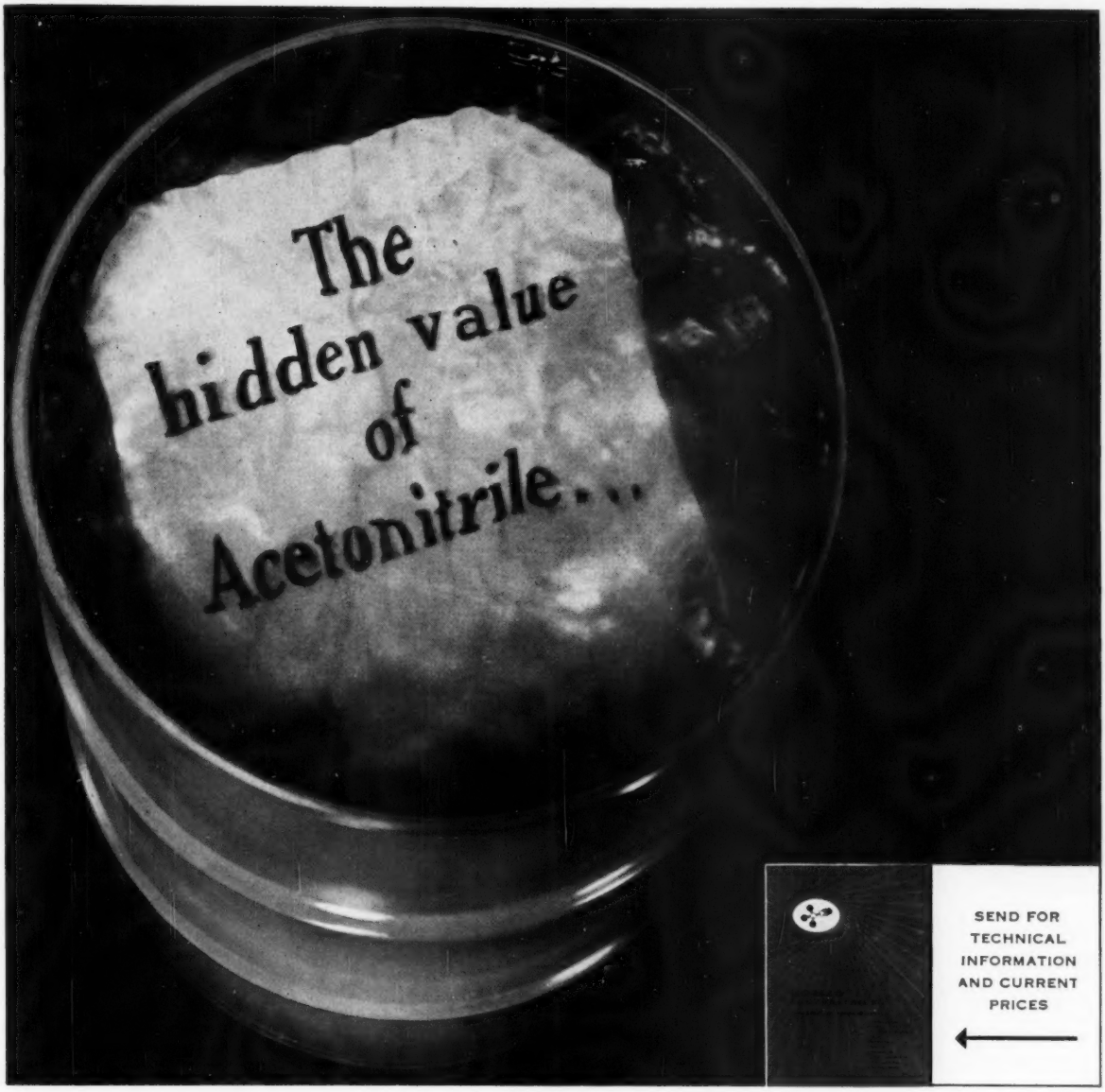

NEW AND UNUSUAL SOLVENT POTENTIAL

What makes the potential of acetonitrile unusual? Unique properties. They account for superior performance over a wide range of applications. Check these examples:

Greater selectivity. As a recrystallization solvent, aceto is particularly practical in the separation of fatty acids. In liquid-liquid separations, several companies are evaluating aceto as a preferred solvent in place of phenol and furfural. One company, previously using acetone in an extractive distillation process, changed to aceto and *process efficiency shot up 58%!*

High solubility parameter and *low hydrogen bonding* make aceto well suited as a solvent for polymers and copolymers. With a parameter of 11.9, aceto shows unusual promise.

And, with Sohio providing a volume source, acetonitrile now takes on a new commercial attractiveness. Whatever your interest, now is a good time to explore what Sohio acetonitrile has to offer. For your own evaluation, see your Sohio representative or write to the address below.

NOTHING HEREIN SHALL CONSTITUTE A RECOMMENDATION TO PRACTICE ANY INVENTION COVERED BY ANY PATENT WITHOUT PERMISSION OF THE PATENT OWNER.

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formaldehyde from Allied Chemical is ready to ship. Night or day, just call us and we start loading a truck from our bulk formaldehyde terminal nearest you. Odds are your shipment will be at your plant before you pull in the gate next morning. Of course we ship by tankcar too – from our South Point, Ohio, plant in 10,000- and 8,000-gallon resin-lined cars. • Service as you like it when you like it is a habit with us. So is a product that is low in acid, iron and non-volatiles and tops in quality. Why not get this service and quality by making Allied Chemical formaldehyde a habit with you. Just call.

For specs and local offices, see Chem. Materials Catalog, page 272A; Chem. Week Buyer's Guide, page 27. 2819

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Business Newsletter

CHEMICAL WEEK
December 2, 1961

Chemical industry dividend payments will set a new high this year. It was believed nearly certain that last year's $1.04-billion record would be topped (*CW Special Report, Nov. 4, p. 106*), but it looks now as if the payout will come close to $1.08 billion. That's based on official 10-month totals just compiled by the Commerce Dept.'s Office of Business Economics.

One reason for the brighter showing: Chemical companies are being more generous with year-end extras than they were in '60. Du Pont, for example, is declaring a year-end dividend of $3/common share, 75¢ more than it voted a year ago. The increase reflects a 50¢ extra recently declared by General Motors, and boosts Du Pont's payment to $7.50/-share. Last year's total was $6.75. Shareholders of record Nov. 28 will get the $3 bonus (biggest paid by the company since '55) on Dec. 14.

•

There's more than one way to deal out extras. Here's an indication of the various methods used by chemical process firms to reward stockholders:

Standard Oil Co. (Indiana) declared a special dividend of one share of Standard Oil (New Jersey) stock for each 60 shares of Indiana Standard. This is in addition to a unusual quarterly dividend of 35¢. Both are payable Dec. 27 to stockholders of record Dec. 1.

Crown Zellerbach directors declared a 10% common stock dividend and the usual quarterly common dividend of 45¢/share. The stock dividend was made, said officials, to conserve the working capital of the corporation, and at the same time to give its common stockholders "tangible evidence" of company growth.

Earlier this month Pfizer tacked a 25¢ extra to its regular quarterly dividend of 15¢/share of common. Both are payable Dec. 13 to shareowners of record Nov. 27.

Eli Lilly pays 50¢ quarterly, but on Dec. 15 will pay an additional 50¢ to stockholders of record Dec. 1. The pharmaceutical company made no extra payment last year.

•

Four chemical companies will be acquired by Philips Electronics & Pharmaceutical Industries Corp. The acquisitions were authorized by Philips directors late last week, do not require stockholders' approval. Terms were not disclosed.

The companies to be bought: Agricultural Chemicals, Inc. (Llano,Tex.); Ok-Tex Chemicals, Inc. (Lubbock, Tex.); DePester Western

Chemicals, Inc. (Fresno, Calif.); and Specifide, Inc. (Indianapolis). Their total annual sales: $40 million.

The Philips' directors last week also proposed the transfer of Thompson-Hayward Chemical to Philips Electronics from Consolidated Electronics. CE, which owns 67% of Philips, acquired Thompson-Hayward earlier this year for 225,000 shares of CE stock.

Terms of the transfer were not revealed, but Philips says that its stockholders will be asked to approve the switchover.

•

Anaconda Aluminum plans to boost its primary aluminum output, says Anaconda Executive Vice-President Mord Lewis. A feasibility study is under way that could result in enlargement of the Columbia Falls, Mont., plant from its present two potlines to three, or perhaps construction of a new reduction works somewhere in the Ohio Valley.

Primary production operations at Columbia Falls are reportedly running at 100% of capacity—about 65,000 tons/year. Apparent reason behind the likely expansion move: Anaconda Aluminum turns out about 3% of the country's primary aluminum; it supplies 13-22% of the foil and container markets. Now the firm's fabrication needs can be met only by purchases of primary aluminum—from competitors.

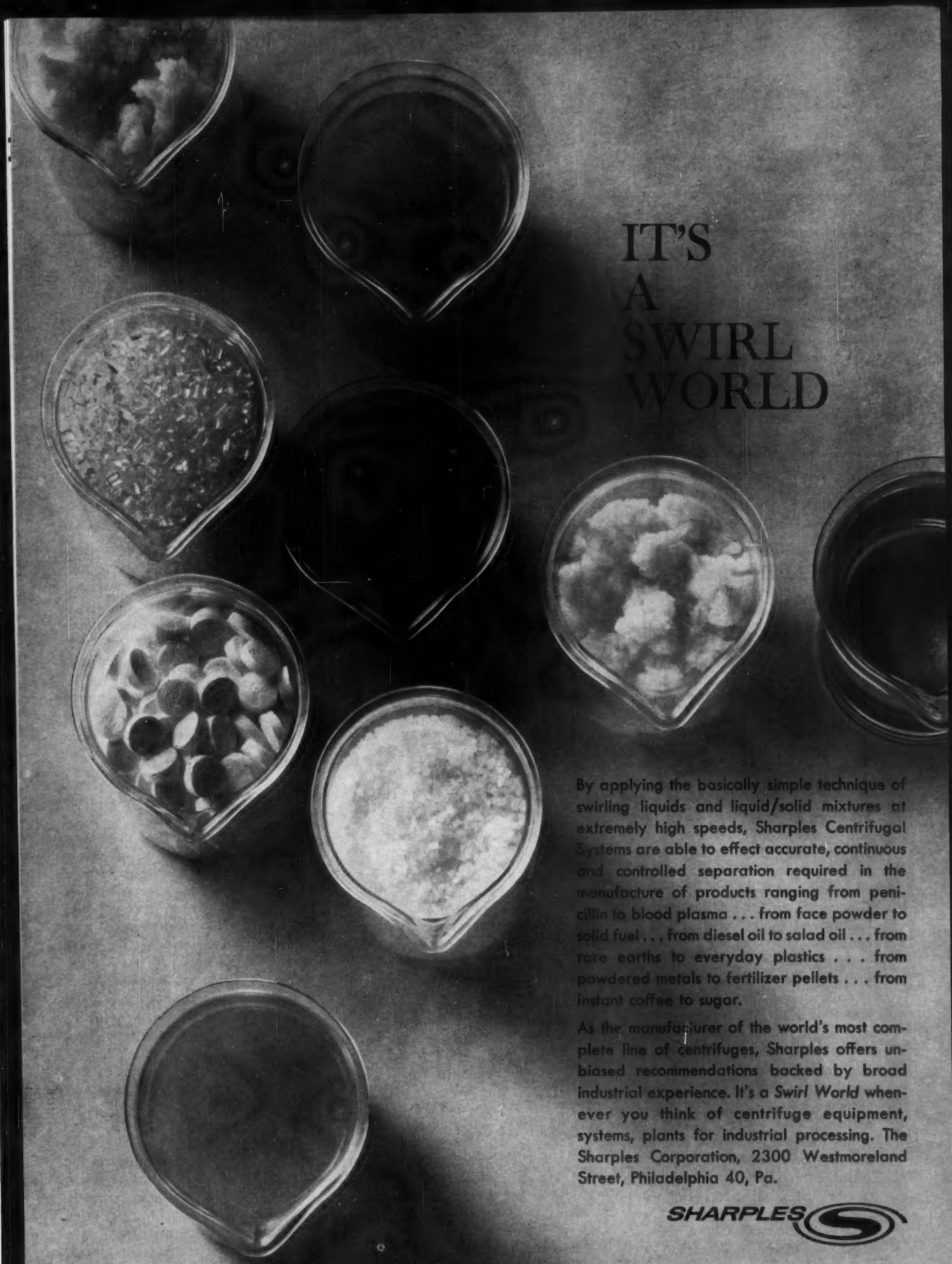
•

Procter & Gamble has asked a federal court to set aside a Federal Trade Commission order for a new antitrust hearing on the company's '57 acquisition of Clorox Chemical. Basis for the request: last June the commission rejected an examiner's ruling that the merger violated the Clayton Antitrust Act. FTC found that the record covered by the examiner (*Aug. 1, '57 through Nov. '68*) did not provide an adequate basis for determining the "legality of this transaction" and ordered the gathering of new evidence on the "competitive impact" since Nov. '58.

P&G, in its complaint filed last week in U.S. district court for the District of Columbia, asks that this ruling be set aside. It contends that the FTC rejection of the original ruling "closed the case." But chances are that if the court upholds P&G, the commission may issue a new complaint based on a post-'58 record.

•

AviSun is going ahead with polypropylene fiber. According to AviSun President Herschel Cudd, the firm is now producing the fiber on a pilot-plant basis but "will not go into full production until the dyeing problem is under control." Cudd says he is optimistic that a solution of the dyeing problem will be found and that AviSun will be in production in two years. Expected markets: rugs, blankets, upholstery, possibly draperies. And for applications in which fiber color is not a factor, Cudd expects to be producing possibly next year.



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By applying the basically simple technique of swirling liquids and liquid/solid mixtures at extremely high speeds, Sharples Centrifugal Systems are able to effect accurate, continuous and controlled separation required in the manufacture of products ranging from penicillin to blood plasma . . . from face powder to solid fuel . . . from diesel oil to salad oil . . . from rare earths to everyday plastics . . . from powdered metals to fertilizer pellets . . . from instant coffee to sugar.

As the manufacturer of the world's most complete line of centrifuges, Sharples offers unbiased recommendations backed by broad industrial experience. It's a *Swirl World* whenever you think of centrifuge equipment, systems, plants for industrial processing. The Sharples Corporation, 2300 Westmoreland Street, Philadelphia 40, Pa.

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Vertical Integration in Petrochemicals

INTEGRATING FORWARD INTO CHEMICALS		INTEGRATING BOTH WAYS			INTEGRATING BACKWARD INTO RAW MATERIALS	
Oil/gas company	Chemical division, subsidiary	Oil/gas company	Chemical company	Joint subsidiary	Chemical company	Oil/gas division or subsidiary
Gulf Oil	Petrochemicals Dept.	Continental Oil	Witco Chemical	Continental Carbon	ALLIED CHEMICAL	UNION TEXAS NATURAL GAS
Humble Oil	Enjay Chemical	Richfield Oil	Stauffer Chemical	American Chemical	Commercial Solvents	Louisiana Gas Producing Co.
Phillips Petroleum	Phillips Chemical	Sinclair Oil	Koppers	Sinclair-Koppers Chemical	Dow Chemical	Bay Refining Co.; Brazos Oil & Gas
Shell Oil	Shell Chemical	Sun Oil	Olin Mathieson Chemical	SunOlin Chemical	W. R. Grace	Cosden Petroleum
Socony Mobil Oil	Mobil Chemical	Tennessee Gas Transmission	FMC Corp.	Petro-Tex Chemical	Monsanto Chemical	Lion Oil
Union Oil	Collier Carbon & Chemical	Texaco	American Cyanamid	Jefferson Chemical	United Carbon	United Producing

Picking Path to a 'Basic' Position

How basic should a petrochemical producer be? That constantly recurring question will get one specific answer during the next three months when the proposed merger of Allied Chemical and Union Texas Natural Gas comes up for ratification by directors and shareholders of the two concerns.

(If the merger is approved, it will probably be consummated late in February, moving Allied up from fourth to third place among chemical companies in sales volume with a consolidated total of some $850 million/year. Net income would rise to about $65 million/year; per-share earnings would continue at approximately $2.50.)

But industry men agree that while this may be a satisfactory answer for Allied, entirely different arrangements can be just as good for other petrochemical producers. Numerous vertical integration plans have been devised to marry hydrocarbon raw materials to chemical technology; these include backward integration all the way to the oil and gas wells, joint subsidiaries, and forward integration on the part of oil and gas companies (*table, above*).

Preferring to Buy: But still other arrangements have been found perfectly suitable. For example, certain pioneers in petrochemical production —such as Union Carbide and Du Pont—say they feel fully protected on their raw material requirements with their long-term, big-volume purchase contracts. To further assure supplies for one of its major petrochemical plants, Carbide owns and operates a pipeline direct to the producing fields.

Yet another arrangement is the one made last year by Rexall Chemical and El Paso Natural Gas. El Paso will put up an olefins plant at Odessa, Tex.; Rexall will build an adjacent polyolefins plant; and the two companies together are setting up laboratory and pilot-plant facilities at Paramus, N.J.

At least five chemical companies have preceded Allied into ownership of petroleum and natural gas operations. But each of these companies relies on other oil and gas companies for much of its petrochemical raw materials. Dow may be the most nearly self-sufficient of these companies in terms of supplying feedstocks for its chemical operations; but Dow's Bay Refining Co. buys all its crude oil, and earlier this year Dow contracted to buy a benzene-toluene mix from Ohio Oil's Aurora Gasoline refinery at Detroit (*CW Business Newsletter, Feb. 25*).

Taking Parallel Path: In some ways, Allied's present plans can be compared to Monsanto's program for a basic position in petrochemicals. Back in 1955, Monsanto acquired Lion Oil Co.—probably motivated mainly by a hankering for Lion's chemical plants, turning out ammo-

nia and various other chemicals. And this year Monsanto has been building a possibly $75-million plant at Chocolate Bayou, Tex., to produce such "basic" petrochemicals as ethylene, propylene, and benzene.

Union Texas does not now have any chemical facilities. It does operate 14 extraction plants turning out natural gas liquids (mixtures of propane, butane, pentane and other light hydrocarbons), but does not do any further separating or processing. If the Allied-Union Texas plan goes through, Allied will build a $40-60 million plant at Geismar, La., to produce olefins and aromatics to be upgraded at other Allied plants (*CW Business Newsletter, Nov. 25*); and raw materials for that Geismar facility would probably come exclusively from Union Texas.

Profitable Prodigy: As a producer and supplier of hydrocarbon raw materials, there's no doubt that Union Texas is both profitable and well endowed. This company—descended from the old Union Sulphur Co., the first U.S. producer of Frasch-process sulfur (1895-1926)—last year cleared nearly $14.2 million on sales of $82.1 million for a profit ratio of 17.1%. (Allied's profit margin last year: 6.7%.)

Union Texas is considered to be the largest independent producer of LPG hydrocarbons; its output of this type of material last year came to more than 8.6 million bbls. It also produced more than 5.7 million bbls. of crude oil and condensate, and nearly 119 million MFC of natural gas.

Theoretical Criticisms: Without attempting to judge the soundness of the Allied-Union Texas merger, which they concede might well be a good move for both companies, some industry men last week voiced criticism of a tendency on the part of some chemical companies to be overeager to integrate backward into raw materials.

Some oil company men warned that with some companies that formerly were big buyers of basic petrochemicals turning into big producers of those same products, there is a clear and present danger of substantial overcapacity in those lines. And some chemical company men were asking whether a large chemical company shouldn't be investing in development and marketing of new and upgraded chemical products, rather than in production of gas and oil.

More general comments on backward integration came in several speeches at last week's meeting of the Manufacturing Chemists' Assn. (*p. 61*). In the panel on mergers, joint ventures and product integration, Vice President Archie E. Albright of Stauffer Chemical declared:

"When integrating backward to produce raw materials formerly purchased, the amount of capital invested is frequently large and does not result in substantial addition to sales dollars. For commodity-type raw materials, which are under industry-wide price pressure already, the amount of profit gained by the integration may produce a low rate of return on the capital invested. In addition, the use of this capital for backward integration may limit the company's ability to undertake more profitable forward integration opportunities.

Selectivity in Investing: And in another panel, Jeremy C. Jenks of the Cyrus J. Lawrence & Sons investment company quoted these recent remarks by Du Pont President Crawford Greenewalt: "In the past 20 years we could have invested hundreds of millions of dollars in facilities for making what we would call marginal-profit goods. For example, we buy $800-850 million worth of raw materials per year, and much of that we could make if we wished. Instead we elected to preserve the strength of our earning power and the proprietary nature of our position wherever that was possible."

But Allied's executives feel that such points do not apply to the proposed merger with Union Texas. They note that Allied is looking toward considerable growth in petrochemicals, with more than 50% of current research expenditures directed toward development of new products and processes based on petrochemicals; that the merger would give Allied an assured supply of petrochemical building blocks for many years and enable Allied to compete more effectively in the expanding markets for polymer chemicals.

Also, Allied management says, gas and LPG produced by Union Texas are high in wanted components (such as ethane and propane) and low in contaminants; and Union Texas operations do not include any unwanted business (such as service stations). The acquisition—to be based on exchange of stock—will not involve any outlay of capital; and will actually increase corporate earning power and profitability.

So it's likely that the proposal will be approved by directors and stockholders. But other petrochemical producers appear to be in no hurry to follow suit by acquiring an oil or gas company just now.

Taking the Plunge?

While Allied Chemical plans to integrate backward into raw materials (p. 24), Pacific Petroleums (Calgary, Alta.) is considering a forward move into chemicals. This year—for the first time since '56—the company will finish in the black and is looking to new profit potential in petrochemicals —and possibly sulfur.

Optimism is based partly on Canada's new National Oil Policy, which calls for nearly 15%/year growth in oil production. Pacific—primarily a gas and oil producing company—places great hope in its 1.3-trillion-cu.ft. gas reserves and 112-million-bbls. oil reserves. Removal of export limitations last year and early completion of the Alberta Natural Gas pipeline to San Francisco and inland U.S. states are expected to increase sales.

In sizing up its prospects in petrochemicals, Pacific hired a specialist formerly with Phillips Petroleum. Since Canadian per-capita consumption of petrochemicals is less than half that of the U.S., Pacific sees a big future in this market. Most logical market is the Vancouver area, which has a population of approximately 1 million.

The company now turns out by-product sulfur only in small quantities. But Pacific President John Getgood is confident that even with increased production, Pacific will be able to market its sulfur domestically within the decade.

Japan Grooms

Japan's Petrochemical Output Goals*

	Thousand Tons/year '61	'63	'65	Annual Growth Rate '60-'65	'65-'70
Ethylene	165-174	339-356	609-722	45%-54%	20%-22%
Propylene	34-28	199-197	396-396		21%-21%
Styrene	61-64.5	87-99.2	118-141.8	26%-30.5%	13%-15%
Butadiene	54-54	82-81	117-117	38%-38%	7%-9.2%
Alkylbenzene	27-27.4	51-51.3	68-68.4	37%-37%	7%-7%
Benzene	180-186.7	265.2-280.5	369.4-390.4	21%-24%	12%-12%
Toluene	77.4-69.2	120.4-100.7	156-129.3	18.5%-16%	13%-10%
Xylenes	57.6-40.1	80.8-65.1	109.7-98.1	24%-22%	10%-11%
Phenol	57.2-57.1	72.2-72.2	95.7-95.7	15%-15%	11%-11%
Phthalic anhydride	64.7-69.4	85.9-94.5	103.6-117.3-	13%-15%	7%-6%
Acetaldehyde	134.1-136.3	200.0-217.0	258.2-275.4	17%-19%	12%-10%
Acetic acid	96.1-98.0	126.1-127.4	159.0-161.1	14%-15%	10%-12%
Ethyl acetate	21.2-23	29-31.4	38-42.3	16%-17%	11%-11%
Butanol	30.9-33.6	44.1-46.5	58.4-61.3	13%-15%	10%-11%
Octanol	25-28	37.2-41	47.2-54	16%-19%	7%-10%
Acetone	25.1-25.9	49.4-47.4	72.6-79.2	30%-32%	13%-15%
Methanol	265.5-265.5	382.4-382.5	510-510.4	19%-18%	10%-10%
Acetylene	342.7-366.4	435.7-464.1	511.7-557.8	12%-15%	4%-4%
Synthetic rubber	90-90	130-130	181.5-181.5	19%-21%	10%-11.5%
Sulfuric acid	4,790-4,843	5,190-5,200	5,690-5,737	4.6%-4.8%	4.0%-5.0%
Ammonia	1,443-1,483	1,680-1,735	1,840-1,840	5%-5%	2.4%-2.5%
(Industrial uses)	300	370	465	12%	7.9%
(fertilizers)	1,143	1,310	1,375	6.0%	0.2%
Polyvinyl chloride	300-335	420-460	520-590	13%-17%	6%-9%
Polyethylene	101-102	164-162	238-269	25%-28%	18%-22%
Polystyrene	36.6-39	52.6-63.0	70-92	18%-25%	17%-15%
Polypropylene		30-30	75-75		24%-32%
Phenolics	57-57	85-85	119-119	20%-21%	16%-16%
Urea resin	152-152.5	193-194.5	237-237	12%-12.5%	7.5%-8%
Melamine resin	16.6-16.6	26.4-26.4	38-38.2	24%-25%	13%-13%
Total plastics	663.2-702.1	971.0-1,020.9	1,297-1,420.2	17%-22%	12%-14%
Caprolactam	50.4-50.4	66.2-66.2	86.1-86.1	15%-15%	12%-12%
(Nylon)	48	63	82	15%	12%
Acrylonitrile	27-27	43-43	72-66	27%-25%	9.8%-8.5%
(Acrylic fibers)	27	43	66	25%	8.7%
Terephthalic acid	36.1-28.5	49.4-42.8	77.9-62.7	27%-22%	7%-11%
(Polyester fibers)	30	45	66	24%	11%
Polyvinyl alcohol	34-29	44-44	66-66	23%-23%	10%-8.5%
(PVA fibers)	29	44	66	24%	8.7%

*Of the two figures for each chemical, the first is an estimate revised to take into account government's current curbs on excessive capital investment.
Source: Ryoji Negishi, from MITI.

Japan's chemical industry metamorphosis—from rags to riches—was spelled out this week at the Chemical Market Research Assn.'s San Francisco meeting. Theme of the meeting: "Chemicals Today & Tomorrow, Western U.S. and Japan."

The profile of Japan's industry was drawn in three speeches by Kiyoshi Morikawa of the Tokyo Institute of Technology; Ryoji Negishi, director of Nippon Petrochemicals Co.; and Sen Yurugi, director of Mitsui Bussan Kaisha. Pieced together from all three speeches, this is the picture that emerges:

From its almost complete destruction in World War II, the Japanese chemical industry now ranks among the world's half-dozen largest. At the war's end in '45, output of sulfuric acid had shrunk to only 380,000 tons/-year, 25% of Japan's prewar rate. Caustic soda output was down to 29,-000 tons (in '46), a bare 7% of the prewar volume. Comparing the '45 levels of output of other products with their prewar levels, nitrogen fertilizer was 51,000 tons (N), 19%; rayon, 15,-000 tons, 39%; and carbide, 143,000 tons, 40%. Plastics output was nil. But by '60 Japan had boosted production to 4.5 million tons of sulfuric acid, 843,000 tons of caustic, 992,000 tons of nitrogen fertilizer (reached in '58), 326,000 tons of rayon ('58), and 1.2 million tons of carbide. And it produced 665,000 tons of plastics. Japan had become the world's leading carbide producer, the second-largest producer of sulfuric acid and rayon, the third-largest caustic soda and nitrogen fertilizer producer, and the fourth-largest producer of plastics.

By '59, 2,129 plants employing 194,000 were turning out chemical products valued at $2.2 billion/year.

Petrochemical Revolution: In common with the European chemical industry, the most dramatic trend within the Japanese industry during recent years has been the shift to petrochemicals. For Japan, the shift came somewhat later, but probably even more suddenly than the parallel shift in Europe.

Although methanol production from dry natural gas was already under way and some fertilizer manufacturers were using crude oil for synthesis

for Export Role

gas or hydrogen production, Japan's petrochemical industry started in '55, when the government launched a program that encouraged producers to rebuild and revamp their plants. In '56, capital investments in the petrochemical industry totaled $23 million. Last year it came to $1.07 billion and it's expected to reach $2.25 billion by the end of '61.

With high raw-material costs one of Japan's major problems, the shift to petrochemicals will have critical importance in its ability to compete against other producing countries. Greater amounts of ammonia will be coming from ethylene plant off-gas and crude oil, less from water electrolysis and coke ovens. Aromatics will increasingly come from cracked naphtha out of ethylene plants and the rafinates of catalytic reformers, acetone and butanol from ethylene and propylene instead of farm products, acetaldehyde from ethylene instead of acetylene. The switch to ethylene from acetylene as a raw material will be forced by the mounting costs of electrical power; but at the same time the price of ethylene will drop as larger plants go up, with 200-million-lbs./-year plants expected to be "not uncommon" in the near future.

Plenty of Problems: But while this petrochemical shift will put Japan on a stronger competitive footing, the host of basic problems confronting Japanese chemical producers make it unlikely that they will be able to give U.S. marketers reason to fear the kind of import "flood" that producers in some other U.S. industries complain about.

With Japan's low wage costs of relatively little advantage in large-scale chemical production, its high material costs loom all the larger. Japan must import 98% of its petroleum, and almost all of its industrial salts, phosphate ore and potassium salt.

Adding to costs is the relatively small size of individual producers. Sumitomo Chemical, Japan's largest producer, lists its gross capital at only $13.3 million, sales at $11.1 million. Of the 4,786 chemical plants in Japan only 67 have more than 1,000 employees, while 2,801 have only four to 19.

Another problem facing Japanese

Shifting to Petrochemical Sources

Product	Source	'58	'60	'63
		(all figures are percentages)		
Hydrogen for ammonia	Water	15.9	11.0	1.9
	Cokes	33.9	16.2	0
	Winkler furnace	12.6	10.3	2.3
	Coal dust	10.9	5.3	0
	Total solids	57.4	31.8	2.3
	Crude oil	7.5	25.0	42.5
	Coke-oven gas	10.9	10.1	19.3
	Natural gas	5.6	15.5	20.6
	Petrochemical off-gas	2.5	5.5	13.4
	Miscellaneous	0.2	1.1	0
	Total	19.2	32.2	53.3

Product	Source	'57	'60	'65	'70
		(all figures are percentages)			
Benzene	Tars	100	88.9	61.2	55.2
	Petrochemicals	0	11.1	38.8	44.8
Toluene	Tars	100	43.3	40.1	31.4
	Petrochemicals	0	56.7	59.9	68.6
Xylenes	Tars	100	18.0	17.4	15.5
	Petrochemicals	0	82.0	82.6	84.5
Acetone	Carbide	0.3	0	0	0
	Fermentation	80.5	41.8	3.8	0
	Petrochemicals	19.2	58.2	96.2	100
Butanol (including secondary butanol)	Carbide	9.3	10.8	3.3	0
	Fermentation	81.6	63.4	11.9	0
	Petrochemicals	9.1	25.8	84.8	100

Product	Source	'61	'65	'70
		(all figures are percentages)		
Acetaldehyde	Carbide	100	48.7	0
	Petrochemicals	0	51.3	100

Source: Ryoji Negishi of Nippon Petrochemicals Co.

producers is their need to rely on foreign technology. Compared with the 2.5% of sales U.S. producers spend on research, Japanese chemical companies spend only 1.5%. On top of this, there is a continuing shortage of highly trained engineers.

The estimated shortage of chemists and engineers by '70 ranges from 100,000 to 170,000. A major expansion of educational facilities will be needed.

A shortage of capital also puts limits on the country's chemical industry growth. For the chemical industry as a whole, two-thirds of total capitalization is borrowed money. For the petrochemical industry, with its heavy expansion under way, twice as much capital comes from loans as from reserves. Several factors lie behind this situation. The highly savings-conscious Japanese put most of their savings in banks and government savings institutions, leaving little available for direct industry financing. Moreover, while dividends have to be paid out of after-tax profits, interest on loans can be deducted from pretax income. But with interest rates running up to 10% for long-term loans, going to the banks is expensive.

Adding to the cost of expansion are stratospheric land costs—$68,000/-acre and up for land suitable for chemical plants. Moreover, there is a shortage of industrial water, and electric power rates recently were boosted 15% from the current 1¢/kwh. rate.

Chaos and Procrastination: Says Ryoji Negishi, the government's control over industrial expansion has led to severe problems in the petrochemical industry, even though it was necessary for its rapid growth. The government insures that industrial expansion follows fixed priorities through its control of foreign exchange, and by granting many tax benefits and special write-off privileges only to approved plants.

This, says Negishi, has led many companies to concentrate on winning approval for projects at the expense of careful study and planning. "Frequently, there will be so many plans for the same final product pending for approval, the government is at a loss as to which plans to approve, and this gives rise to confusion, chaos and procrastination." In a recent case, there were at one time eight applications for alkyl-benzene plants pending government approval. Four have already been approved, and still others will probably be. "This state of affairs will lead to overcapacity, suicidal competition and waste," Negishi warns.

Facing the World: Since Japan's population is only 9 million and personal income is still relatively low, Japanese producers believe they must develop export markets to support economically scaled plants.

But with its raw material and other costs so high and its wage advantage of such little importance in this area, international competition "imposes great hardship on the Japanese petrochemical industry," according to Negishi.

Sen Yurugi points out that in Sept. '60, when the Japanese petrochemical industry was still in a relatively early stage of development, the domestic prices of petrochemicals were much higher than the overseas level—polyethylene 42% higher, acetone 64%, benzene 80%, xylene 63%, phenol 30%.

As technology improves and bigger plants come in, this cost disadvantage should ease. Still, Yurugi believes the Japanese government's plan to liberalize imports shouldn't and won't be applied quickly or fully to the chemical industry. "A sudden liberalization will not allow the chemical industry to recover the blank period of techniques during the war," he says. The tar industry, including benzene, toluene and xylene, is not internationally competitive, he says. Plastics could face foreign competition without much difficulty, "but photographic films would be the hardest hit, and the fermentation industry will be also greatly influenced."

To counter its cost situation and make the most of its cheaper manpower costs—which he says are rapidly approaching, if not surpassing, manpower costs in Europe—Negishi recommends that Japanese petrochemical producers turn out more finished consumer products rather than try to compete directly with industrial chemicals.

As Japan reaches out for export markets and the chemical industry on the U.S. West Coast grows and integrates, Negishi sees "keen" competition developing for the potentially lucrative, but unexploited, markets of Southeast Asia.

Du Pont's Kline: Record sales and earnings in '61; higher peaks in '62.

New Highs in Reach

With demand stepping up to such an extent that some newer products are being rationed to customers, Du Pont is in a bullish frame of mind about 1962.

The company's '61 sales are now expected to end up 2-3% more than last year's record $2,143 million, according to C. A. Kline, Jr., the company's first assistant treasurer; and "we are looking forward to setting a new high in sales in '62." He figures Du Pont sales pretty much parallel the Federal Reserve Board's index, and company economists are projecting an 8-10% rise in gross national product next year (*see p. 29*).

Earnings too are on the upgrade, Kline told a meeting of the Washington Society of Investment Analysts last week. There has been a "modest improvement" in earnings throughout '61, with profit margin climbing from about 20% in the first quarter to nearly 25% now; and this trend is expected to continue into '62.

Du Pont's current capacity is enough to support a sales volume of about $3 billion/year, Kline said; and the company is now operating at about 75% of capacity.

Capital spending this year will total about $200-205 million, off from $214 million in '60. But Kline said the company expects expenditures for new plant and equipment to increase in coming years. Spending on "pioneering" research, he added, amounted to about $60 million last year and should be up 6% this year.

Bigger Gains in '62

A rising tide of business activity next year will carry U.S. chemical production to a high-water mark 8-10% above this year's level. This heartening prediction — heralding a significant gain over the 5% increase anticipated this year (vs. '60)—was voiced this week at the University of Pittsburgh's eighth annual conference on business prospects.

The optimistic prophet: Du Pont economist Charles B. Reeder.

Next year's output of some synthetic materials such as plastics and synthetic rubber may show gains of up to 20%, he predicts, bringing the '62 increase for industrial chemicals as a whole — including synthetics and basic organic and inorganic chemicals — to 12-15%. Synthetic fiber production in '62, however, is expected to increase less than 10%, he adds.

Production of chemical products—such as paints, fertilizers, soaps, drugs and other specialties — should repeat in '62 the 5-6% gain being realized this year, Reeder says. "These products," he notes, "are less sensitive to business cycles than industrial chemicals. They neither decline as much during contractions nor do they rise as much during recoveries."

Gain during Slumps: He says that, with an 8-10% production increase next year, the chemical industry will be right in step with total industrial production in the U.S. His thesis: that in outpacing total industrial production (by something like 6.2% to 3.5% in average annual growth rates) during the past 50 years, the chemical industry has made its greatest relative gains during recessions, when other industries experience declines in output.

In periods of recovery, he says, the chemical industry expands with, but usually not much more than, total industrial production. In '58, for example, when total industrial production declined 8% from '57, chemical production remained unchanged. In '59, when total industrial production rebounded 13%, chemical production climbed 14%.

By and large, Reeder concludes, the chemical industry is in good shape, having operated at close to 90% of capacity in all but two years of the past decade. Capacity rose by an average of 7.5%/year during the '50s, only slightly more than the 6.8%/year average rise in production. Some segments of the industry have been plagued by temporary excess capacity, he concedes, "but resourceful marketing has usually corrected these problems."

Du Pont's Reeder: Foresees 8-10% rise in chemical output next year.

Steady Growth to '70: Within a framework of continued economic growth for the country as a whole through the '60s, Reeder predicts, chemical production should continue to increase at its historical growth rate of 6-7%/year.

Reeder's optimism for the chemical industry in '62 was supported by speakers from other industries that are large consumers of chemical commodities.

Construction, predicts Edwin W. Magee, Jr., of MacKay-Shields Associates (New York), "will reach a new all-time high . . . in dollar terms," with total value of work and materials approximating $61 billion. Increases in nonfarm housing will be modest. But expenditures on additions, alterations, and maintenance will be almost as great as those for new houses, thus expanding a market for producers of building materials. Nonresidential construction also will have a good year in '62.

Even the petroleum industry, despite its executives' complaints, is expected to fare well. C. W. Lutz, director of Gulf Oil's Planning and Economics Dept., predicts production increases for all major petroleum products except aviation gasoline, with kerosene and petroleum coke output to rise about 10% over '61 levels.

Antitrust Trio

Three developments highlight the week's chemical industry antitrust activity: (1) a change in plea obviating one trial; (2) the conclusion of a second; (3) continued bickering at a third.

Olin Mathieson and Chemetron withdrew their previous pleas of innocent, and pleaded *nolo contendere* (no contest) to charges of criminal contempt of court (*CW, Nov. 25, p. 24*). The plea was changed in the second day in court, after Judge Jacob Mishler denied a motion for a hearing on whether a 1952 judgment against a carbon dioxide pricing conspiracy could be applied to Olin and Chemetron.

Both Olin and Chemetron felt that the trial would become much more time-consuming and expensive than they had expected. Olin saw little precedential value in the trial, inasmuch as CO_2 comprises less than 1% of its sales. Chemetron announced that its "involvement in the matter alleged in the petition was minimal."

Sentencing of Olin, Chemetron, General Dynamics, Air Reduction, and the four executives involved will be on Dec. 15. Olin and Chemetron will have an opportunity to present briefs before that time.

The Penn-Olin joint venture trial drew to a close in Wilmington. Both sides will be allowed to present final arguments to the court on Feb. 7 (*CW, Nov. 25, p. 24*).

And in Chicago, Du Pont and government lawyers continue to hassle over the divestiture of Du Pont's GM stock (*CW, Nov. 4, p. 24*). The two sides have reached agreement on several minor points, but still differ on one big thing—whether Christiana also must get rid of its GM shares.

Christiana holds that since it has not been adjudged to have violated any laws, the court does not have the power to require it to divest the GM stock. Further, it now owns 535,000 shares, or 0.2% of GM's outstanding common stock. Under Du Pont's plan, Christiana might receive an additional 4 million shares, giving Christiana 1.7% of GM's stock. Du Pont and Christiana maintain that this is not enough to influence GM management —particularly in that Christiana would give up voting privileges on its GM shares.

national roundup

Companies

Humble Oil & Refining Co. (Houston) and Olin Oil & Gas Corp. (New Orleans) have reached tentative agreement on a plan whereby Humble would acquire Olin's assets in a tax-free exchange for common stock of Humble's parent company, Standard Oil Co. (New Jersey). Current market value of that much Jersey Standard stock: close to $60 million. Completion, subject to approval of Olin shareholders and the government, is expected early in '62.

Allied Chemical Corp. (New York) stock has been listed for trading on the Pacific Coast Stock Exchange and the Midwest Stock Exchange. Allied reports that since '56 the number of its stockholders living in the Midwest has increased 30%, and in the Western states, 26%.

Purex Corp. Ltd. (Lakewood, Calif.) has declared a two-for-one stock split to be delivered as a 100% stock dividend Dec. 29 to stockholders of record Dec. 8.

British Oxygen Canada, producer of industrial and medical gas, has reorganized its marketing operations under a new name, Canadian Oxygen Ltd.

Dow Chemical Co.'s Texas Division (Freeport, Tex.) is offering the services of its metal-cleaning and galvanizing department to Gulf Coast industry. Facilities include equipment for pickling, chemical cleaning, sand blasting, high-pressure jetting, flame cleaning and other surface preparation.

Nalco Chemical Co. (Chicago) will absorb its wholly owned subsidiary, Visco Products Co. (Sugar Land, Tex.), at the close of business Dec. 31. Visco, which makes corrosion inhibitors, emulsion breakers and other oil field chemicals, will retain its present management and become an operating division of Nalco. Nalco says the merger will simplify corporate structure and help coordinate research and development activities among all its divisions.

Expansion

Sulfur: Freeport Sulphur Co. (New Orleans) is preparing to open bids on a new $3.5-million production platform for its sulfur mine in the Gulf of Mexico off Grand Isle, La. Freeport will use the platform to drill wells into the sulfur deposit and will install equipment for bringing ore to the surface. A similar unit was installed last year (*CW Market Newsletter, June 11, '60*).

Herbicides: Spencer Chemical Co. (Kansas City, Mo.) has begun construction of a plant to produce specialty organic chemicals at Pittsburg, Kan. First product of the unit, due onstream next summer, will be Carbyne, a weed killer. Capacity, the company says, will be "sufficient to supply Spencer's domestic and export requirements."

Salt Cake: Ozark-Mahoning Co. (Tulsa, Okla.) has completed a 50% expansion of its Brownfield, Tex., sodium sulfate plant. The enlarged facilities will account for 115,000 of the 155,000 tons of the 99%-pure material produced by the company this year. The other 40,000 tons comes from the Ozark-Mahoning plant at Monahans, Tex.

foreign roundup

Dyes/Japan: Japan's dye industry reports export sales to India, Pakistan and other southeast Asian countries averaged $167,000/month in September and October, double the $84,000/month average in January-March. Industry spokesmen look for the figure to hit $280,000/month soon. Their reasoning: textile industry is developing in these countries; Japanese dyestuffs now compare favorably with German and British products in quality and price; manufacturers have stepped up overseas marketing.

Investments/Australia: The New South Wales Government Office has published a list of Australian companies seeking U.S. business partners on either joint-venture or licensing basis. Included are firms active in medicinal products, leather finishes and paints, zinc products, ethical pharmaceuticals, and food-mixing chemicals.

Rayon/Japan: Toyo Rayon has received inquiries on possible sale to the U.S.S.R. of $83.3 million worth of chemical fibers during the first six months of '62. Included are rayon yarn and filament, nylon and rayon tire cord, nylon belts, fishing nets and ropes. Toyo says it will have to ask other Japanese manufacturers to come in on joint export basis to fill the orders.

Petroleum/West Germany: Marathon International, subsidiary of Ohio Oil Co. (Findlay, O.) and Wintershall AG. have agreed to construct a 40,000-bbls./day oil refinery at Mannheim, West Germany. Wintershall is Germany's largest potash producer, and has "substantial" holding in B.V. Aral, a leading marketer. The plant is due to start operating in spring of '64.

Washington
Newsletter

CHEMICAL WEEK
December 2, 1961

The chemical industry's need for scientists and engineers by '70 has been revised upward. A survey by the National Science Foundation finds that requirements for scientists and engineers some nine years hence will reach 158,000, a sizable increase from 58,000 employed in '59. Earlier projections had placed the industry's need for scientists and engineers in '70 at 152,000.

The study was done for NSF by the Bureau of Labor Statistics and is based on industry trends between '54 and '59 plus interviews with executives of 40 leading chemical companies. In '59 these 40 firms employed about 45% of the industry's workers, 59% of its scientists and engineers and 38% of its technicians.

All indications are, the survey finds, that the "rapid and sustained growth" of the industry between '54 and '59 will be continued on at least the same level. Chiefly, the rise reflects growing demand for plastics and other synthetic products and such basic chemicals as sulfuric acid and soda ash, paints and drugs. For the future, company officials see intensified development of new products and increased diversification into new areas and new markets by a large number of firms.

Most of the companies interviewed expect large increases in research and development activities, intensifying the need for additional scientists and engineers. This is particularly true of firms producing drugs and medicines, forced by competition to develop new and improved products. Several may diversify into production of food items.

An oddity uncovered by the study is that the small chemical companies "have been achieving the most rapid rates of growth in scientific and engineering staffs. In all probability they will continue to do so."

In recent years, the survey finds, employment of biological scientists by chemical process industries has advanced rapidly. Next are increases in the employment of medical scientists, agricultural scientists and physicists. Engineers continue to represent the same proportion of such personnel, while the proportion of chemists employed by the CPI actually declined slightly, although their employment rose in absolute numbers.

NSF made no estimate of whether this trend will continue. But it does feel that the proportion of highly skilled workers (technicians, scientists and engineers) will continue to rise in the next few years. Automation is reducing the number of production workers employed.

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A nationwide search for 2,000 scientists and engineers by the National Aeronautics and Space Administration is getting results. Recruiting drives in Chicago, Denver and Phoenix were successful enough

Washington Newsletter

(Continued)

to encourage NASA officials to believe they will meet their goal by the time they have completed their drive in 30 or more major cities in the next six to eight months.

Initial response was good, say officials, even though the government pays scientists and engineers generally about $1,000/year less than does private industry. The differential increases to an average of $3,000 to $4,000/year at executive levels. NASA has set aside about $100,000 for its recruiting campaign.

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AEC's effort to get out of the commercial nuclear business is getting new impetus. The Atomic Energy Commission has created a new Division of Industrial Participation. Purpose: to speed the day when the nation's nuclear supply and production needs can be furnished by private industry. For years, AEC has supplied many nuclear items and services because they were unavailable commercially.

Head of the new division is Ernest Tremmel, who helped put the Euratom assistance act together. His office will serve as a focal point for disseminating information on the types of industrial activities performed at AEC installations and indicating which of these might be best suited to private enterprise. As a start, Tremmel has called a meeting for the first week in January with the Atomic Industrial Forum and industry representatives to determine the line of attack.

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Suspension of the "constant charge" proposal of truckers by the Interstate Commerce Commission was brought about by a barrage of shipper protests. In the forefront were complaints from drug makers and retailers, representatives of the rubber industry, and the National Paint, Varnish and Lacquer Assn. They and others strongly oppose elimination of classification ratings on small shipments.

Under the plan, truckers would levy flat rates at varying weight levels for shipments of 300 lbs. or less. Charges would be based only on weight and distance and not on classification. Shippers apparently feel that rises in shipping costs would more than offset declines and that they would not share in the savings in paper work that would be realized by the truckers. ICC is still considering the proposal.

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Massive financial aid is being extended to Brazil to help that country out of its serious economic and political troubles—and a large part of the money will go into chemical process industries. From a variety of sources, $500-600 million is on its way to Brazil, or will be by the end of the first quarter of '62.

Initial loans will cover payments of Brazilian imports of essential products from the U.S. Among these are oil, fertilizers, rubber, copper products, metal alloys, industrial machinery and some specialized construction equipment. Later loans will go for electricity and water projects. U.S. officials are hoping the moves will help promote democracy in Brazil.

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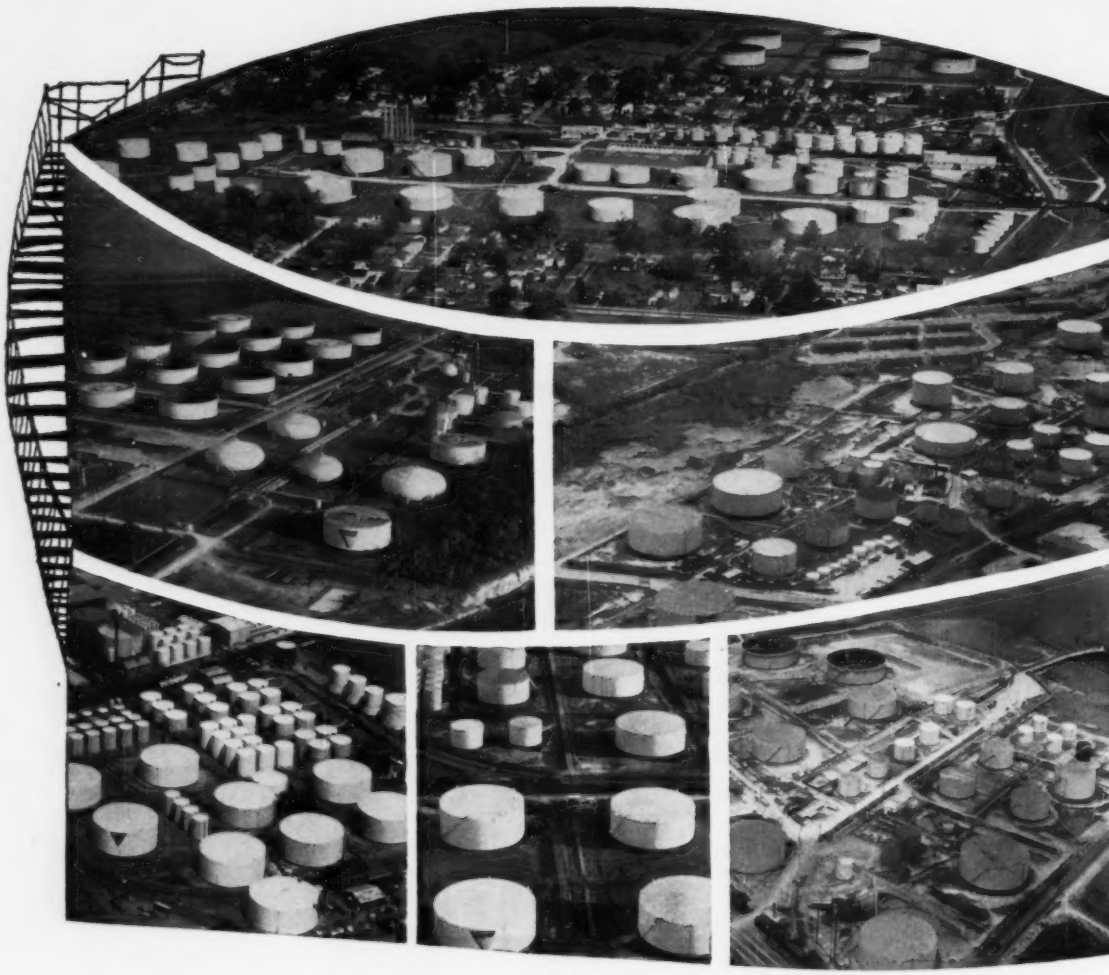

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Mexico: Now Fertilizer Exporter

Fertilizantes del Istmo S.A., a newcomer in Mexico's chemical process industries, has signed agreements that will make it the first Latin-American company to export fertilizers.

The firm, owned by Mexican and Cuban interests, will start exporting high-analysis chemical fertilizers next year under compensated import-export agreements with two U.S. companies —International Ore & Fertilizer (New York) and Woodward & Dickerson, Inc. (Philadelphia), which will sell the Mexican fertilizers on the world market.

Under the agreements, Istmo will export 20,000-30,000 tons of fertilizers in second-half '62, matching dollar-for-dollar the value of 22,000 metric tons of anhydrous ammonia it is importing this year.

New Twist: Compensated import-export agreements are allowed under a new system introduced by Mexico's Secretariat of Commerce and Industry. It allows Mexican industrial firms to import certain products on the condition that they export an equal amount of the same type of product manufactured in Mexico. This differs from ordinary compensated trade agreements, in which there is no necessary relation between the kind of products exchanged. Most Mexican exports under compensated trade agreements are agricultural products and minerals.

Istmo's imports of anhydrous ammonia will supply its new plant with raw material until the government oil monopoly, Petroleos Mexicanos (Pemex), completes its adjacent Minatitlan ammonia plant. Pemex, which ran short of funds and halted construction of all petrochemical projects about a year ago, has resumed work on the 200-tons/day ammonia plant and expects to complete it this December. Istmo will take the entire output under a long-term agreement.

In a separate deal, Istmo won a recent South Korean bidding, and will export 9,650 metric tons of ammonium nitrate, valued at about $850,000 to that country in first-half '62.

Boost for Mexico: The company put its first units onstream at the end of August. The completed complex, costing $11.5 million, will be Mexico's biggest nitrogen fertilizer producer. It will turn out 66,000 tons of nitrogen annually, in the form of 45,000 tons of 45% prilled urea, 40,000 tons of 33.5% prilled ammonia nitrate and slightly more than 100,000 tons of various other fertilizer blends.

Right now a 150-tons/day nitric acid plant and a 200-tons/day ammonium nitrate plant are operating, and a 140-tons/day prilled urea plant will be completed in March. The latter will produce urea for animal feed and industrial uses as well as for fertilizer. Also slated to be onstream in March are a 150-tons/day sulfuric acid plant, a 50-tons/day phosphoric acid plant, and a 300-tons/day high-analysis fertilizer plant.

Fertilizantes del Istmo is 20% owned by Pemex. The group making up the rest of the majority Mexican interest is headed by Emilio Almada. The Cuban group is headed by Sergio Garcia Palacio, former head of Cia. Cubana del Nitrogeno. The project is expected to be partly financed by a $5-million loan from the U.S. Export-Import Bank.

The Mexican company is handling its own construction, with machinery coming from Chemical & Industrial Corp. (Cincinnati). C&I is also supplying the nitric acid and ammonium nitrate plants, while Dorr-Oliver is expected to supply the phosophoric acid plant design, and Japan's Toyo Koatsu the urea process.

A Frasch-process plant will fill the project's sulfur requirements from Jaltipan, 30 miles away. Phosphoric rock will be imported from Tampa, Fla., to the Gulf Coast port of Coatzacoalcos, in ships that will carry sulfur in the opposite direction.

Other Projects: Meanwhile, another new Mexican company is going ahead with nitrogen fertilizer production plans. Fertilizantes del Bajio, controlled by Sociedad Mexicana de Credito Industrial, will invest $4.8 million in its prilled urea plant at Salamanca, in central Mexico. Pemex will supply the ammonia from a plant going up at its refinery there.

About half the costs are being financed by the Ex-Im Bank and the Worms Bank (Paris), and with equipment credits from U.S. and Mexican suppliers. The plant will use the process of Lonza Elektrizitatswerke & Chemische Fabriken of Switzerland. Lummus Co. and Sociedad Mexicana de Credito Industrial are handling the engineering.

Bajio plans to set up a phosphoric fertilizer plant at the same site.

Two other Mexican nitrogen fertilizer projects have been operating for some time. The government-controlled Guanos y Fertilizantes de Mexico turns out about 20,500 tons/year of nitrogen in the form of 100,000 tons of 20.5% ammonium sulfate. And Fertilizantes de Moncolva (which is partly French owned) produces 21,774 tons/year of nitrogen in the form of 65,000 tons of 33.5% ammonium nitrate.

Pushing Exports: The compensated export scheme by which Fertilizantes del Istmo will sell some of its fertilizers is part of the Mexican government's drive to boost exports, particularly of manufactured products.

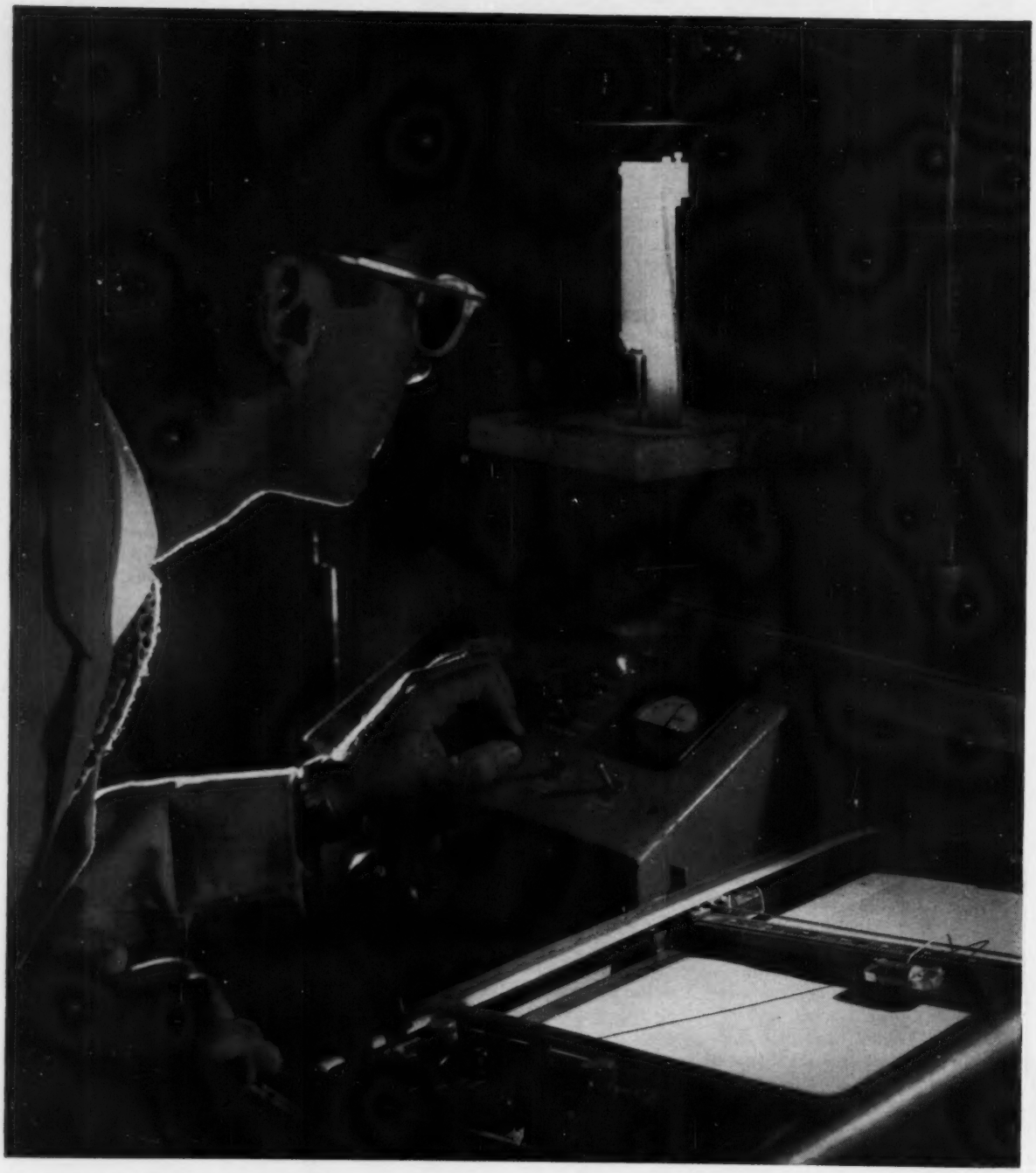
Chemicals are expected to eventually play an important role in Mexican exports to the Latin American Free Trade Assn. (LAFTA), which will go into operation on a limited scale next year.

Negotiations between the nine members over reciprocal tariff concessions are under way now in Montevideo, Uruguay. The members: Argentina, Brazil, Chile, Mexico, Paraguay, Peru, Uruguay, Colombia and Ecuador.

Mexico has requested tariff concessions from the other members on petroleum, rubber and aluminum products, copper and manufactured copper products, drugs, paints, oils and varnishes, pulp and paper products, chemicals and textiles. In return for concessions on these and other products, Mexico is offering concessions on fertilizers, chemical products, disinfectants, insecticides, and other manufactured goods and raw materials.

This is the first of 12 annual negotiations. The tariff cuts in each are expected to total at least 8% of the combined duties and other charges.

How controlled stress makes Glasteel™



strong

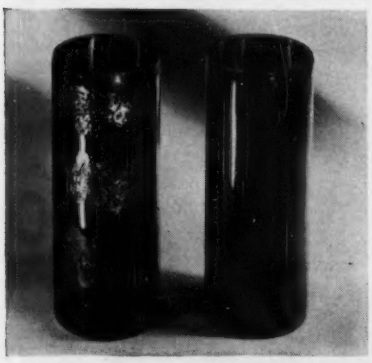
If you're concerned about the possibility of a glassed-steel vessel crazing from thermal shock . . . if you've had doubts about its ability to stand up to mechanical shock . . . read on to learn how stress data recorded by the research apparatus at left are translated into structural strengths.

The glowing sample of Pfaudler Glasteel has just undergone a stress-strain analysis. Differential expansion between glass and steel was recorded during controlled heating. Reason? To determine how much compressive stress is present in the glass.

This stress, called a compressive cushion, is *designed into* Glasteel to permit it to bend, stretch, breathe—absorb thermal shock.

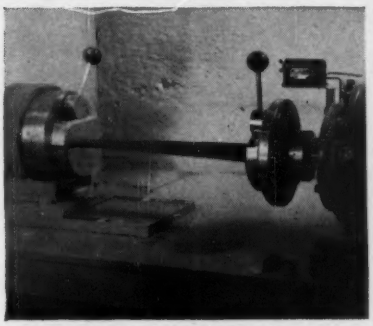
And the precise stress-strain tests which we employ permit us to predict and control the amount of compressive cushion in Glasteel over the complete operating-temperature range of a fabricated vessel.

260°△T. Controlled stress in Glasteel gives you the thermal protection of a 260° differential between product and jacket media at an operating temperature of 250° in all vessels through 2000 gallons. (We consider this a safe recommendation because it contains a very generous factor of three, based on carefully controlled laboratory experiments.)



In spite of an unusually high 455° thermal shock, no damage was done to the lab sample of Glasteel pipe at right, glassed with today's standard Pfaudler glass. Pipe at left was glassed with our previous standard.

Locked together. Glasteel as a material of construction is strong in other ways, too. The bond between the glass and steel, created by chemical action during firing, locks the components firmly together. Like this:



Even though the Glasteel bar has been twisted to the elastic limit of the steel, the glass-to-steel bond and the glass itself remain intact.

Bolt torque test. So strong is Glasteel that in a bolt torque torture test on a glassed flange, the steel portion of the flange yielded before the glass.

More tests. In point impact tests, Glasteel is 2½ times more resistant than safety plate glass. Under conditions of erosion-corrosion, it is more abrasion resistant than most metals.

On both the Knoop and other hardness scales, the glass component in Glasteel is harder than the common metals.

Summing up. When you specify Pfaudler Glasteel process equipment, you want excellent acid-alkali resistance. You get it. In addition, you get a compressive cushion to stand up to thermal and mechanical shock, a virtually indestructible bond between glass and steel, a hard, nonporous product-contact surface. And the assurance that our specifications are the accumulative result of extensive lab tests and many years of field experience.

Bulletin 985 is our fact book on Glasteel. For your copy, please write to the address indicated.

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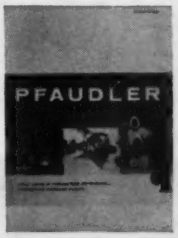
Pfaudler Project Engineering can help with any or all of the following: (1) Design of the system or plant, (2) Specification and selection of equipment, (3) Detailed plant layout, (4) Procurement and expediting, (5) Assistance in erection, (6) Start-up assistance and personnel training.

You provide the process and/or process data. We take it from there for such diverse fields as chlorine dioxide, polymerization, solvent recovery, esterification, detergents, resins, and recovery of metal finishing wastes. Inquiries invited.

Handbook for corrosion-resistant piping. Bulletin 987 details our line of Glasteel pipe, valves and fittings. In its 16 pages you'll find the specifications you need to eliminate corrosion as a problem when you transfer materials to and from process equipment. Ask for a copy.



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G61-11

Growth Without Strain

A 50% increase in over-all industrial production of the "Atlantic community" during the 1960-70 decade was set as a goal last week by representatives of the 20 nations that are members of the Organization for Economic Cooperation and Development (CW, Nov. 25, p. 21). It will be an easy mark for nearly all of Europe's chemical industries to equal or exceed, agree Western Europe's chemical industry spokesmen.

In fact, the goal is regarded by industry and government people alike in Europe as a "realistic" one for the Atlantic community as a whole, and as one that will probably be met without difficulty by nearly all of the OECD member nations. Likely exceptions: Britain and Belgium.

From '55 through '60 the British chemical industry's output showed an average annual increase of 6.4%, compared with 2.7% for the country's total industrial production.

Since the chemical industry is a much larger factor in total industry output in Britain than it is in the U.S., the British chemical industry would have to boost its growth rate considerably to help the nation meet the OECD goal of a 4.2% over-all economic growth rate.

West Germany's economic growth has slackened markedly in the past half year, and even optimists there expect the "breathing pause" will extend at least through '62.

Nevertheless, gross national product (GNP) growth for '61 will be about 6-7%; and a gain of 5-6% is anticipated for '62—indicating that German industry as a whole will meet the OECD goal for '70 without visible strain.

Similarly, Germany's chemical industry is now growing at a more moderate rate, but definitely faster than OECD's 4.2% standard. Chemical output was up 12% last year, relative to '59; further gains of 6% each are expected for both '61 and '62.

French chemical companies have been growing notably faster than other industries, were already planning a 27% rise between '61 and '65 that works out to a 6.1% annual average (*CW, Oct. 28, p. 24*).

One problem that could hold down growth rates, especially in Germany and Britain: chronic labor shortages.

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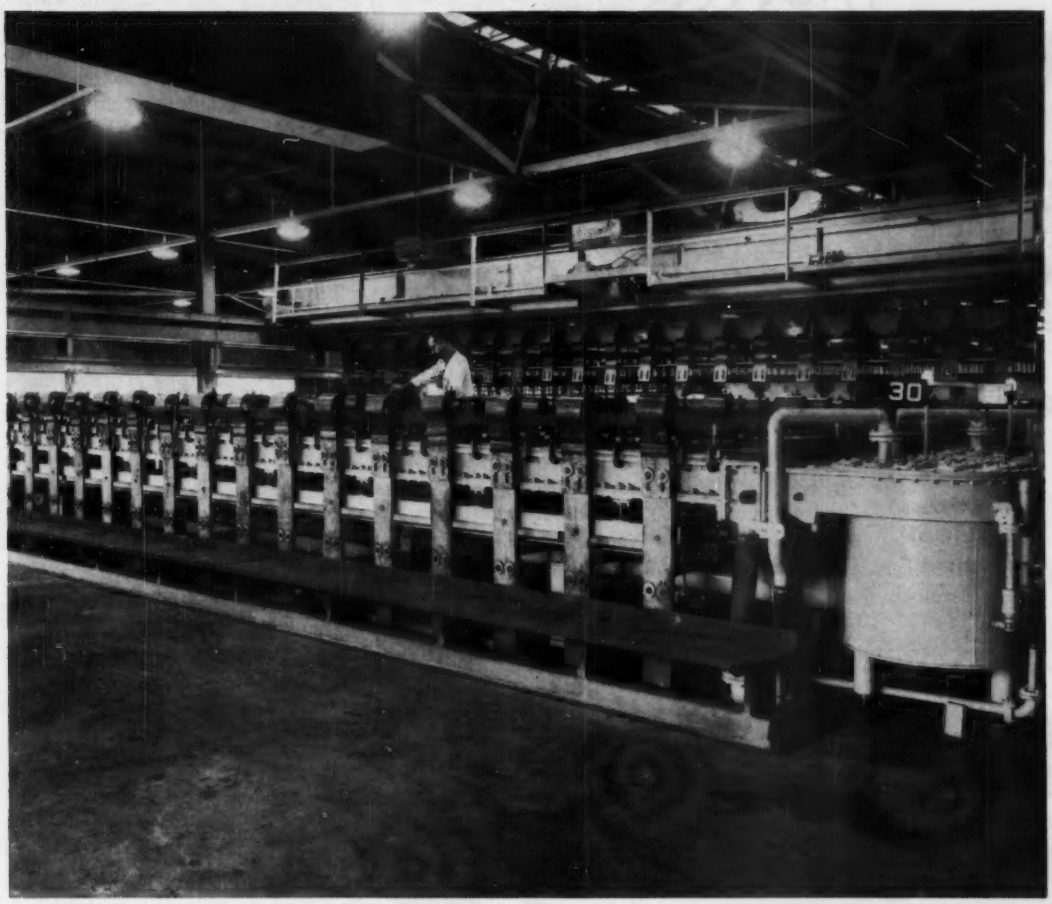

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WORLD WRAP-UP

Sales/South America: Du Pont is consolidating some of its South American sales and service operations under its subsidiary, Du Pont de Nemours Argentina, which will handle textile fiber (except nylon) and petrochemical sales in Argentina. It will also provide technical service to distributors in Argentina, Chile, Paraguay and Uruguay.

•

Petrochemicals/Egypt: Italy's ENI has signed a $50-million credit for Egypt, including $30 million for construction of a petrochemical plant in the Suez area.

•

Pharmaceuticals/Australia: Farbenfabriken Bayer has formed a subsidiary in Sydney called FBA Pharmaceuticals Ltd. to sell and eventually produce pharmaceuticals.

•

Sales/U.K.: Glaxo Laboratories Ltd. reports that although sales in the year ending June 30 were 7% higher than in the previous year, pretax profits fell 4%, particularly overseas, where Glaxo chalks up 60% of its total sales. Net profits after taxes: $19.42 million, excluding profits of Evans Medical, which joined Glaxo during the year.

•

Soviet Oil/U.K.: According to Britain's influential *Financial Times* the British government is engaged in a "major" review of the whole range of problems connected with possible U.K. imports of Soviet oil, evidently in preparation for next spring's trade talks with the U.S.S.R.

Official government spokesmen, however, say the review is simply part of routine re-examination of oil and trade problems. This goes on constantly, they say, is in no way out of the ordinary.

•

Petrochemicals/Australia: The first two units of the five-plant petrochemical complex at Altona have been formally opened: Altona Petrochemical Co.'s ethylene and butadiene plant and Australian Synthetic Rubber Co.'s SBR synthetic rubber plant. Altona Petrochemical is wholly owned by Standard-Vacuum Oil Co., which is also half-owner of the rubber plant with Goodyear Tyre & Rubber Co. (Australia).

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VOLUME III

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Eight new members that comprise the 9 and 10 series Pluronic polyols are of special interest. These polyols complement and enhance the versatility of the other members of the series.

The physical properties of the new members are less temperature sensitive than those of lower molecular weight. Most all of the new members show greater surface tension reduction, allowing for much better wetting. Those grades in the solid form possess sufficiently high detergent properties to indicate promise for use in formulated bars or tablets. The new 9 and 10 series of Pluronic polyols also opens the entire field of emulsification applications (e.g., typical xylene-water system emulsions, based on Pluronic polyols, remained stable through several successive freeze-thaw cycles).

This material and more is contained and described in the new expanded Grid. A proved, practical research short cut for formulators, the Pluronic Grid approach is of inestimable value as a means of systemizing their research . . . helping to eliminate random evaluation of unrelated materials.

What singles out the Pluronic series

Chemists know that polyoxyethylene compounds are water soluble—no matter how high their molecular weight. For many years it was generally assumed that polyoxypropylene compounds would also be water soluble. However, the fact is: at a molecular weight of about 800-900, polyoxypropylene glycols become essentially water insoluble. As the molecular weight of this chain increases, it becomes more hydrophobic.

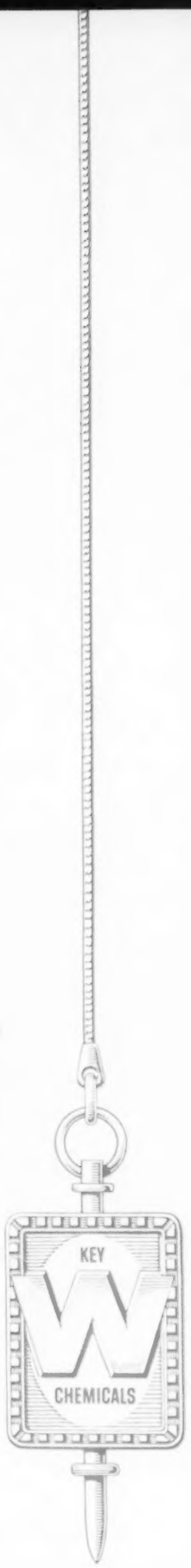
Investigation at Wyandotte (U.S. Patent #2,674,619) revealed that if water-soluble polyoxyethylene groups were added to both ends of the water-insoluble polyoxypropylene chain, a complete series of new block-polymers with highly desirable surface-active properties could be obtained.

These block polymers are prepared by adding propylene oxide to the two hydroxyl groups of a propylene glycol nucleus. The resulting hydrophobic base can be made to any controlled length, varying from 800 to many thousands in molecular weight.

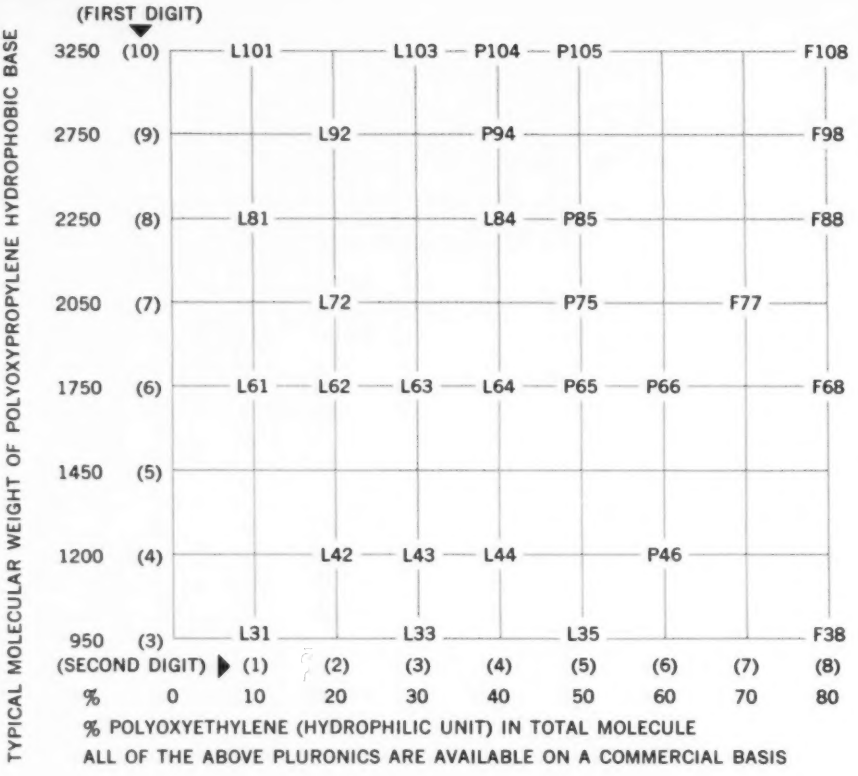
By adding ethylene oxide to both ends of this hydrophobic base, it is possible to put polyoxyethylene hydrophilic groups on the ends of the molecule. These hydrophilic groups are controlled in length to constitute anywhere from 10% to 80% of the final molecule. The simplified structure can be represented as:

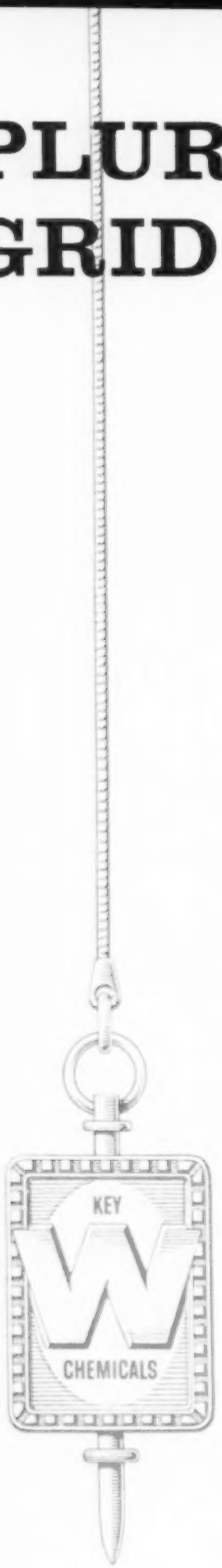
$$HO\,(CH_2\text{-}CH_2\text{-}O)_a\,(CH\text{-}CH_2\text{-}O)_b\,(CH_2\text{-}CH_2\text{-}O)_c\,H$$
$$\qquad\qquad\qquad\qquad\quad |$$
$$\qquad\qquad\qquad\qquad CH_3$$

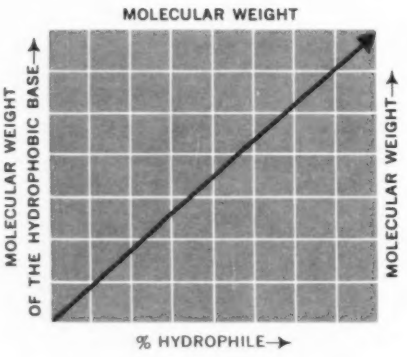
Other products on the market can usually vary only the hydrophile. The Pluronic polyols are unique in that the size of *both* the hydrophobe and the hydrophile are variable, offering an additional dimension of freedom. This produces a wider range of properties, which vary in smaller, more controllable increments.

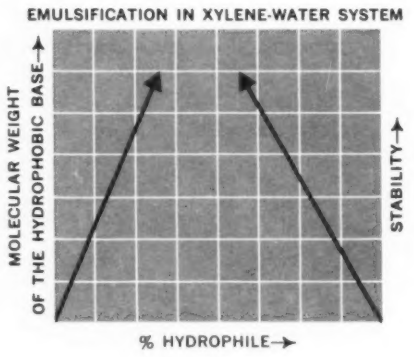


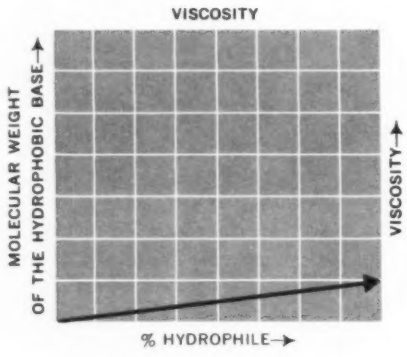
PLURONIC GRID

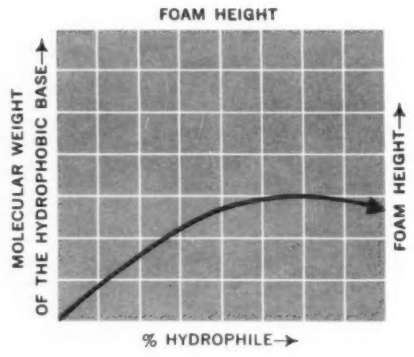

(FIRST DIGIT)
TYPICAL MOLECULAR WEIGHT OF POLYOXYPROPYLENE HYDROPHOBIC BASE
3250 (10) L101 L103 P104 P105 F108
2750 (9) L92 P94 F98
2250 (8) L81 L84 P85 F88
2050 (7) L72 P75 F77
1750 (6) L61 L62 L63 L64 P65 P66 F68
1450 (5)
1200 (4) L42 L43 L44 P46
950 (3) L31 L33 L35 F38
(SECOND DIGIT) (1) (2) (3) (4) (5) (6) (7) (8)
% 0 10 20 30 40 50 60 70 80
% POLYOXYETHYLENE (HYDROPHILIC UNIT) IN TOTAL MOLECULE
ALL OF THE ABOVE PLURONICS ARE AVAILABLE ON A COMMERCIAL BASIS

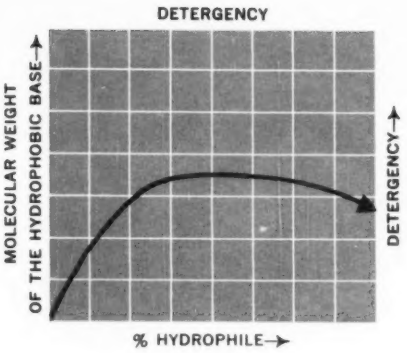


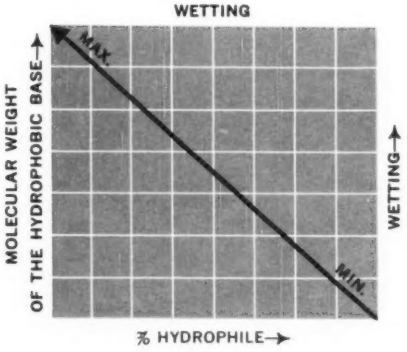


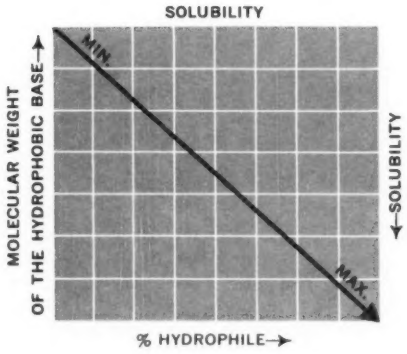


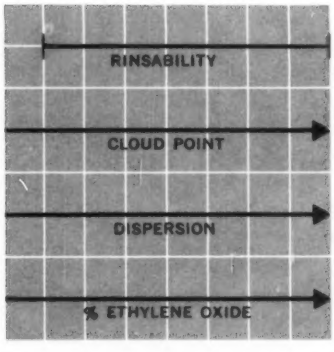












The Pluronic polyols range in physical form from mobile liquids to solids sufficiently hard to be flaked. They are 100% active in all forms, and exhibit a wide variety of surface-active properties. They range in molecular weight from 1,000 to over 16,000. They vary from materials that are almost water insoluble to materials that have no cloud point—even at the boiling point of water.

Identification of Pluronic Polyols

To simplify the naming of the Pluronic polyols, they are identified by a letter (L, P, or F) and a number. The letter identifies the physical form of the particular Pluronic polyol: L for liquid, P for paste, F for flake. The first digit or digits identify the typical molecular weight of the hydrophobic base, as indicated by the column to the left of the Grid. The last digit indicates the approximate per cent of ethylene oxide in the total molecule.

Thus, Pluronic F108 is a flake with a typical hydrophobic-base molecular weight of 3250; approximately 80% of the molecule, by weight, consists of hydrophilic polyoxyethylene groups, and the remaining 20% is the hydrophobic polyoxypropylene group.

Total molecular weights of the Pluronic grades can easily be approximated. For example:

$$\text{Molecular weight of F108} = \frac{3250}{.20} = 16250$$

3250 is the typical molecular weight of the polyoxypropylene base for those Pluronic grades whose first digits are 10. And .20 means that approximately 20% of the molecule, by weight, is polyoxypropylene.

The Pluronic Grid approach and its advantages

The Pluronic Grid is a graphic representation of our broad series of Pluronic polyols, formed by plotting molecular weight ranges of the hydrophobe against the per cent of the hydrophile in the final molecule. In brief, these are the advantages:

1. *Provides a controlled systematic method of screening.*
2. *Minimizes costly random screening by establishing property trends.*
3. *Offers a single method of determining the effects of changes in molecular weight and in hydrophobic-hydrophilic ratio.*
4. *Helps develop new products and processes by the accumulation of information on related grades of the Pluronic series that would have been impossible with random screening of other surface-active agents.*
5. *Permits the chemist to find the Pluronic or combination of Pluronics with the best balance of properties for the solution of his problem instead of trying to formulate to a surfactant's properties.*

How to use the Pluronic Grid

Because of the wide range of molecular weights obtainable in the Pluronic series—and because of the two degrees of freedom (controlling the molecular weights of both the hydrophobe and the hydrophile)—properties of the Pluronic grades can be plotted as trends across the Grid.

By observing these trends, the formulator can select—from the Grid—those Pluronic grades having the best balance of properties for his particular application. After only a few laboratory tests, he can narrow this area down to the best Pluronic polyol or combination of several grades for his formulation.

Known trends for several general properties of the Pluronic series are shown; other specific trends can be determined easily by evaluating a few Pluronic grades from various positions on the Grid. In this way, it is possible for anyone to plot his own trends . . . individual trends directly pertaining to his own operations, conditions, or problems.

Example I:

Formulation of an Insecticide Compound

In formulating an xylene-type insecticide, it is desired to add a surface-active agent having the following properties:

1. *It must be a good emulsifier.*
2. *It must have low foam.*
3. *It must cause good wetting.*
4. *It must possess good lime-soap-dispersing ability.*
5. *It must be soluble in cold water.*

Rather than initiate a random evaluation of all the unrelated surface-active agents now commercially available, the formulator can save research time—and direct his efforts in an organized approach to the problem of selecting a suitable sur-

factant—by referring to the Pluronic Grid.

The emulsification property is perhaps the most important. The polyols at the top center of the Grid give the best xylene-water emulsification properties. The members of the series in the upper right quadrant show the best lime-soap-dispersing, while the members in the upper left quadrant show the best wetting properties. The lowest foaming members of the Grid are on the extreme left-hand side. Being nonionic, the Pluronic polyols are inversely soluble with temperature . . . all of the members of the series possess good cold-water solubility characteristics.

Since emulsification, good wetting and good lime-soap-dispersion are the most important properties, the formulator should evaluate the Pluronic grades **L103, P104, L92** and **P94**. This systematic approach to the problem can eliminate much fruitless work in the unprofitable areas.

In actual tests on the xylene-water system, Pluronic **L103** has appeared to be the best member in the series for this application.

Example II:

Formulating a Home Laundry Detergent Compound

The surface-active agent used in a detergent should have the following properties—low to moderate foam, solubilizing ability for lime soaps, good detergency and good rinsability.

As you proceed across and up the Grid, the foam characteristics of the Pluronic polyols increase to a maximum and then decline.

Pluronic polyols with the best soil removal properties are found in the center portion of the Grid. All of the Pluronic polyols are excellent lime-soap-dispersants; the most efficient are located in the upper right-hand quadrant. All of the Pluronic polyols exhibit excellent rinsability.

Since rinsability, desired foaming characteristics, and detergency are the most important properties, the formulator should evaluate Pluronic grades **L62, L63, L64, P65** and **P75**, or **F68, F77, F88, F98** and **F108**, if a solid surfactant is desired.

By applying this systematic approach, the formulator can eliminate much fruitless work and extensive testing of many unrelated surface-active agents.

The PLURONIC

series has a growing list of commercial applications

Agricultural Products: Emulsifiers; emulsion stabilizers; dispersing and wetting agents.

Cosmetics: Deodorants; hair preparations; lotions; oral-hygiene products; shampoos*.

Formulated Detergents: Laundry products*; dairy cleaners; detergent sanitizers; floor cleaners; rug cleaners; mechanical-dishwashing products*; rinse aids*; scouring powders; foam level control.

Latex and Rubber: Stabilizers; viscosity regulator for styrene-butadiene latices; vulcanizers.

Lithography: Dampener roll cleaners*.

Metal Cleaning: Alkaline metal cleaners*; aluminum anodizing; passivating; steel pickling.

Metal Cutting: Water-soluble coolant and lubricant formulations*; resinoid grinding wheels*.

Paint: Emulsion paints*; pigment dispersing; improved leveling, spreading, and brushability; viscosity control.

Paper: Coating colors*; reducing viscosity; pigment dispersing; latex stabilizing.

Pharmaceuticals: Dispersants for antibiotics; solubilizers for antibiotics and vitamins.

Petroleum*: Demulsifying agents; dispersants and lubricants for drilling muds; wetting agents for secondary recovery.

Plasticizers: Methylmethacrylate, phenol-formaldehyde, urea-formaldehyde, and polystyrene resins.

Polyurethane Resins*: Reacting with diisocyanates to give economical foams of superior properties.

Soap: Soap-synthetic and all-synthetic bars; lime-soap dispersant.

Textiles: Desizing formulations; antistatic agents; continuous hypochlorite bleaching; dye leveling*; kier boiling; soaping-off prints; softening warp sizes.

Water Treating*: Boiler water; scale prevention in industrial water supplies.

And in many other miscellaneous uses such as: Defoaming agents; mold-releasing compounds; water flooding; etc.

**Technical Data Sheets available upon request.*

The Pluronic Grid can help you choose the proper chemicals for testing, but only a thorough evaluation in your own laboratories can give you the full scope of what the Pluronic polyols can do for you. Write today for samples, general listing of physical properties, data sheets pertinent to your application, and other technical information. Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.

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FORM NO. 189-61

PRINTED IN U.S.A.

Henry Gribou, president of German-based Dragoco's U.S. subsidiary, spearheads expanding New Jersey operation.

CW PHOTO—JOAN SYDLOW

Benjamin Fainberg, Dragoco's U.S. general manager, offers domestically made and imported fragrance raw materials.

On the Scent of New U.S. Sales

Last week Carl Heinz Geberding, president of West Germany's leading producer of fragrance raw materials, Dragoco GmbH. (Holzminden, Germany) was winding up a U.S. visit that has double significance to the aromatics industry.

For Henry Gribou, president and treasurer of the U.S. wing, and Benjamin Fainberg, general manager (*above*), the visit was further assurance that Dragoco counts on expansion of its U.S. subsidiary to help maintain the parent firm's fast, postwar growth pace.

And for the scores of other U.S. makers of perfume raw materials, it served notice that their young rival—Dragoco has had a U.S. operation for little more than five years—is out for more business in this highly competitive field.

The U.S. subsidiary is already a substantial contributor to Dragoco's business. Although the firm won't talk about operations, it does say the Totowa force brings in "several" million in sales each year and that Dragoco (excluding subsidiaries) has moved into the $10-million/year class.

Also, expansion of the U.S. venture is clearly in mind. Last December additional land was acquired next to the present plant. But neither Geberding nor the Totowa, N.J., plant staffers would detail the plans for the new site.

Word from Home: Divulging information to the public has never been the rule for this family-owned firm. But in recent weeks at Holzminden, Dragoco officials—who have won their top position in German fragrance industry only since the '40s—have been willing to tell some of the details of Dragoco's growth—a story that hints strongly of its plans for its U.S. venture.

Carl Geberding inherited control of Dragoco from his father—now retired—who began selling flavors and fragrances from a converted manufacturing shop in Holzminden in '19. Prewar sales were up to about $1 million annually, but Dragoco didn't really start to score major sales gains until the late '40s.

Several factors worked in the firm's favor—and helped ease operations in the rough postwar period. For one thing the Holzminden plant remained intact during the war. And, although Dragoco did not receive any money from the Marshall Plan, it profited, like the rest of the European economy, when Marshall Plan dollars helped stabilize business and created a demand for goods.

Another factor: the political division of Germany meant that the established center of the prewar fragrance industry — Leipzig — was in Commu-

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nist hands, eliminating nearly all of Dragoco's former Western market competitors.

The company was also able to profit from its former rival's know-how by hiring fragrance experts who had fled East Germany.

But after these developments Dragoco wasn't the only fragrance firm in West Germany. Haarmann & Reimer, an older company and, like Dragoco, a family enterprise, was once the larger of the two. (The companies are neighbors, both located in Holzminden.) However, while Dragoco grew, H&R saw its share of the market decline, and it was finally bought by Farbenfabriken Bayer.

Dragoco emerged as Germany's biggest fragrance and flavors raw-material producer—with exports accounting for about 60% of production—as well as one of the country's biggest family-owned enterprises.

Who's in Charge: Along with Carl Geberding, oldest son of the firm's founder, two other men share in the top decision-making: Wilhelm Karl Prinz von Preussen, executive vice-president and grandson of Germany's Kaiser Wilhelm; and Horst Geberding, the founder's youngest son, who is Dragoco's chief perfumer and technical director.

All three cite Dragoco's small size (German labor force of 600) as the reason for the firm's flexibility. "We can arrive at a decision within 24 hours," says Wilhelm von Preussen. "The same decision may take months in a big concern . . . and over-all we seem to have done rather well."

Dragoco can point to its sales, which have doubled in the past five years, as testimony to the effectiveness of such flexibility. Plant capacity has also expanded, along with bigger investments in research.

Westward Ho: Germany's postwar economy didn't hold only good news for the company. U.S. chemical companies darted after the German market—through exports and outright acquisitions. Their competition stimulated Dragoco to look for other outlets to keep sales moving ahead. Soon after the war (the elder Geberding was still heading the company) the firm began to look into the U.S. cosmetics and food market—easily the largest in the world—as a natural area for expansion. The result was Dragoco's first subsidiary (and still its most ex-

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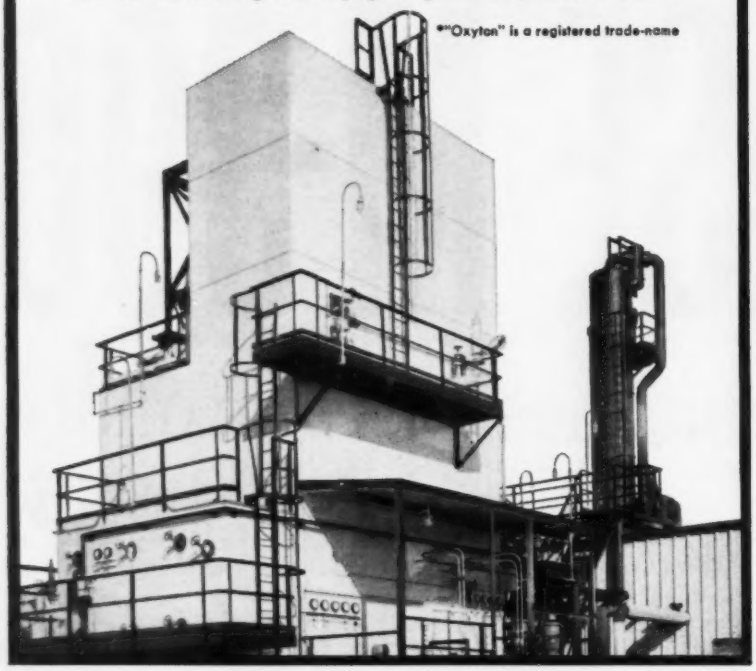

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tensive), which was followed by operations in Italy, Switzerland, France and Austria.

The U.S. company originally worked out of a rented office building in lower Manhattan. But getting established turned out to be more difficult than they had thought. As Carl Geberding notes in retrospect, "Only people as naive as we were at the time would have undertaken the task of breaking into the U.S. market on a shoestring, and competing with well-established fragrance manufacturers that had far superior sales methods."

Only when he and an American coworker "took to the road and visited potential customers personally" did Dragoco start to ring up sales. The biggest help on their cross-country tours was the "Dragoco Report," a monthly 20-25-page bulletin, printed in Germany—a sort of perfumer's trade publication—which mixed equal doses of Dragoco product information with technical guidance on how to use them. This journal, which now appears in German, English, French, Italian and Spanish, has about 17,000 readers. Geberding says, in fact, that the four-color bulletin, imprinted with the Dragoco insignia, a coiled red dragon, has been perhaps the most important factor in making Dragoco known in this country. One example: an advertisement offering a brochure on infrared spectroscopy brought about 1,000 U.S. requests, including 40 from American universities. The same ad in the German edition drew far fewer responses.

Slow Start: Sales expansion, however, was slow in the beginning. Dragoco management traces this to the nature of its business — three to five years are needed to develop finished products. And until last year's opening of the Totowa plant, its operation here was limited largely to its role as a selling agent for the parent German company. Some technical-service research work had been done in New York, but in the main the office coordinated sales of imported products through sales agents in Chicago and Cincinnati.

However, U.S. cosmetic and food companies made it clear that they couldn't continue to risk dependence on the vagaries of imported fragrances. Thus Dragoco set up the plant in which it now manufactures its own perfume oils (it won't say how

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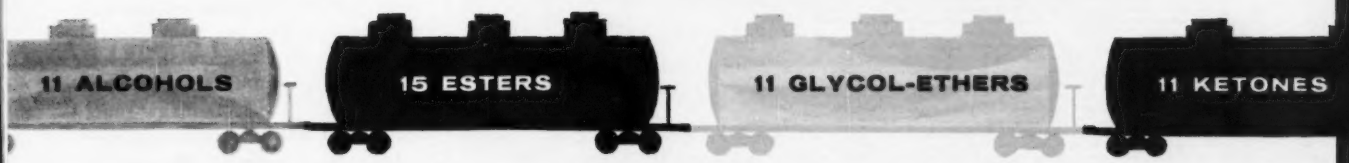

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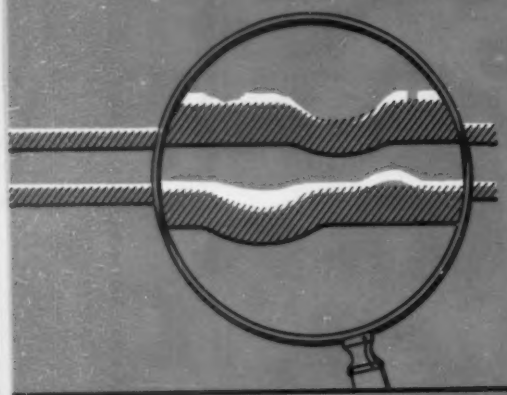
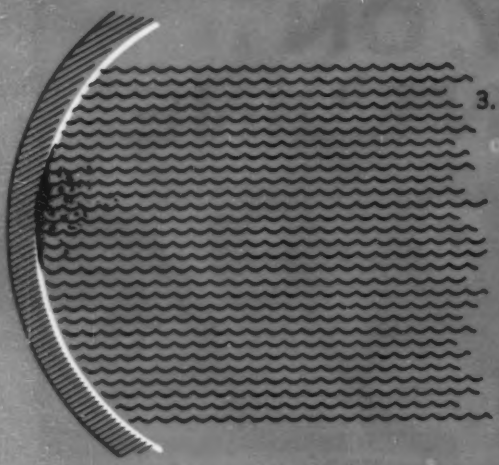
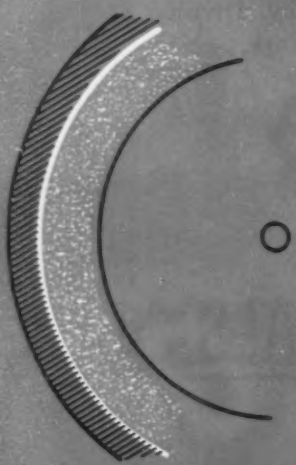


2. may have globs, skips, thin spots, blisters, pinholes or improperly cured areas.



3. These potential failures permit your product to contact the steel, causing corrosion, contamination and customer complaints. They occur in ordinary application and baking methods.



4. Rheem Centrifugal Lining process leaves nothing to chance. By reducing solvent content, eliminating air turbulence and human error, lining thickness is controlled to less than 1/10-mil variation.

much), although the subsidiary still takes fragrances and etherin oils from Germany.

Currently on the staff: seven fragrance chemists and a dozen technical sales representatives. They are directed by Gribou, who was formerly with Colgate-Palmolive and succeeded Carl Geberding as president and treasurer; William Foley, vice-president; and Fainberg, general manager.

They keep in close touch with the German operation. Each makes periodic trips back to the parent Dragoco GmbH. And the latter also farms out "guest performers" to the Totowa plant for training purposes. "There is much to learn in the U.S. In sales methods—in men's cosmetics and aerosols, for instance — the U.S. is years ahead of Europe," says one Dragoco spokesman.

Major in Menthol: Right now, one of Dragoco's biggest-selling products, both in the U.S. and abroad, is menthol—the firm in Germany is one of the world's largest manufacturers (*CW* capacity estimate: 200 tons/year). The U.S. subsidiary does not make menthol, instead imports a portion of the German production. Because of this arrangement, menthol became subject of a German-American state trade agreement. The U.S., in an effort to minimize import of products that might be of Communist origin (Red China is a large supplier of menthol), requires that Dragoco prove that it imports all its peppermint oil (for menthol) from non-Communist countries. In fact Dragoco's major supply comes from South America.

Aside from menthol, Dragoco has done much work on synthetic essential oils, has come up with a substitute for natural jasmin oil. Price: $49/lb., compared with $800/lb. for the natural oil. And it markets a laboratory replacement for the rare Bulgarian rose oil, price of which is $218/lb. —about one-fifth the price of natural oil.

Part of Dragoco's job in the future will be to widen its circle of customers. In less than half a dozen years, it hasn't been able to reach all the perfume product users it would like to. But German chemical makers have learned to move aggressively into the U.S. markets, and the Dragoco red dragon is plainly getting ready to take a bigger bite of the market that so far it has only tasted.

New Drug Entry

Automatic Cafeterias for Industry (Westbury, N.Y.), a vending machine company, plans to move into the multibillion-dollar proprietary drug and sundries market.

The firm, which recently introduced automatically vended diet drinks, now expects to market a vending machine that dispenses items usually sold over the counter in drugstores and supermarkets. First location: a laundromat in East Meadow, L.I., N.Y.

Automatic Cafeterias, viewing the success of similar machines that sell milk in apartment houses, foresees more than a $2-million business from vending these items in metropolitan New York. According to company President Meyer Blinder, this venture will mark the first time automatic dispensing of proprietary drugs and sundries has been brought "practically into the home." The vendors will supply items—e.g., burn ointments, Band-Aid, aspirins, petroleum jelly and throat lozenges—that can't be bought when drugstores and super-markets are closed.

The initial installation is a test case in which item preference will be checked. Twenty different items—many of them packaged in "emergency-size" packets—will be rotated in the machine and vended for 25¢ each. The selection of the proprietary drugs will be guided by state law limitations.

Out of the Woods

Weyerhaeuser Co. (Longview, Wash.) is offering three new product groups, all chemically derived from Douglas fir bark (similar products were previously made by mechanical fractionation).

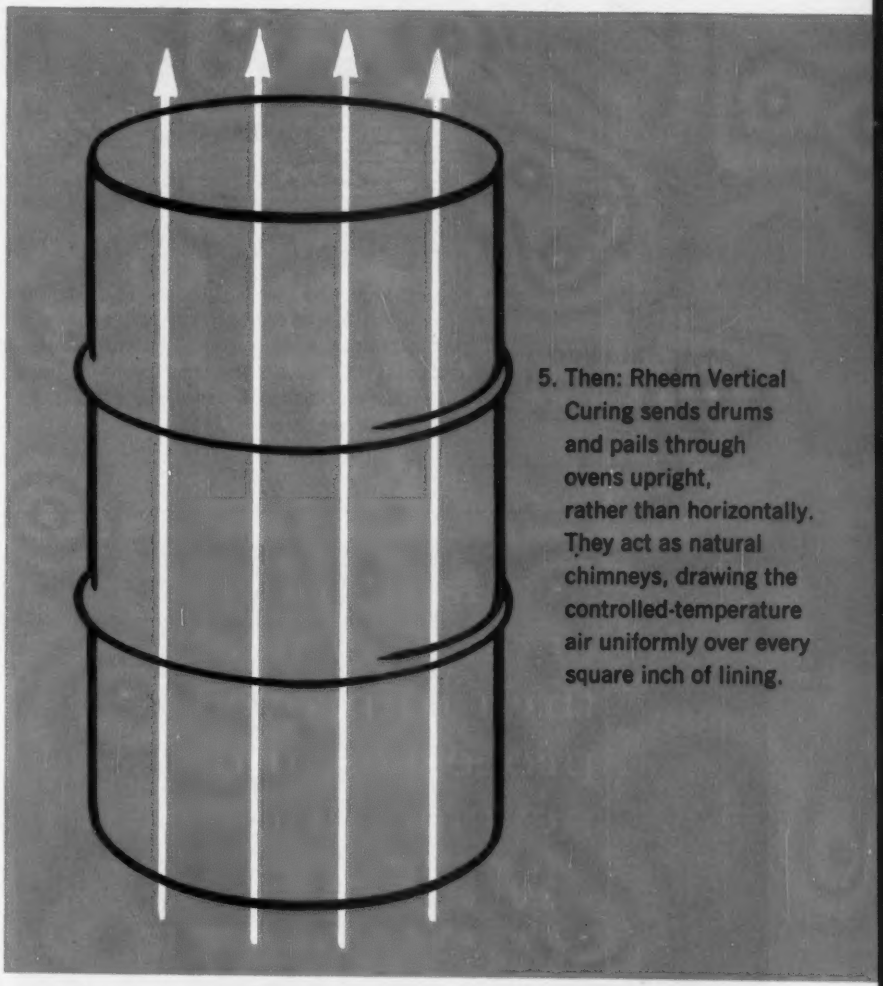
WEF (Weyerhaeuser Extracted Fibers), a lignocellulosic fiber designed to replace sisal in polyester premix compounds, is said to be cheaper and have better handling characteristics. It can also be used as a reinforcing material in phenolic compounds.

Wey-Chem products, a mixture of phenolic acids in the form of sodium salts, are available in powder and aqueous solutions. Wey-Chem BD-50 is higher in viscosity than Wey-Chem BD-100 and contains sodium salts of long-chain aliphatic acids in addition to sodium salts of phenolic

EVERY LINING IS UNIFORM

in drums and pails lined and cured by

Rheem Centrifugal Process



5. Then: Rheem Vertical Curing sends drums and pails through ovens upright, rather than horizontally. They act as natural chimneys, drawing the controlled-temperature air uniformly over every square inch of lining.

And that's not all. For several years now, these unique developments have been providing the best product protection in steel containers. The patented Rheem Centrifugal Lining process insures that the application rate and spray angle are always constant. Lining quality is further improved by unique Rheem Vertical Curing in three stage, high temperature ovens. For more information, or for help in developing a lining for a problem product, write the world's largest manufacturer of steel shipping containers at 1701 West Edgar Road, Linden, New Jersey.

Plants across the country . . . Chicago; Freeport and Houston, Texas; Linden; New Orleans; Richmond and South Gate, Calif.; Tacoma. For other sales offices see the Yellow Pages.

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acids. Both can be used as dispersants, binders and adhesive ingredients.

Firwax 102 is a hard wax for carbon paper inks and Firwax 120 is intended for investment casting waxes. The products are being produced in a $250,000 pilot plant (ton/shift capacity). A full-scale plant will likely come later.

EXPANSION

New Plant: Continental Chemical (Paterson, N.J.), manufacturer of surface-active agents, textiles and chemical specialties, has acquired a new plant at 270 Clifton Blvd., Clifton, N.J., will move in December.

•

Canadian Purchase: Nopco Chemical Canada Ltd. (London, Ont.) has purchased Canadian Aniline & Extract Co., Ltd. (Hamilton, Ont.). The acquired firm will operate as an independent subsidiary. Harry Batley, president of Nopco Chemical Canada, will become president of Canadian Aniline, while W. P. Gudgeon, its founder and former president, will serve as consultant and a member of the board of directors. Canadian Aniline's principal products are ethylene oxide adducts, sulfate and sulfonated oils.

PRODUCTS

Polyester Fiber Dye: Eastman Chemical Products (New York) has developed an orange dye for use on polyester fibers. It's called Orange 3RLL, produces a bright red shade of orange. It's also designed for cellulose acetate and nylon fabrics.

•

Epoxy Stripper: A cold stripper for epoxy coatings is being marketed by Fidelity Chemical Products Corp. (470 Frelinghuysen Ave., Newark, N.J.) under the name Fidelity 931 Stripper. It can be used on aluminum, steel, copper or brass, is nonflammable, and is applied at room temperature.

•

Promoters: U.S. Peroxygen Corp. (850 Morton Ave., Richmond, Calif.) has added three promoter formulations to its line of organic peroxides for reinforced plastics. CN-6 is a 6% colbalt napthenate; CO-12, a 12% cobalt octoate; and CN-S6, a 6% cobalt napthenate in which styrene replaces the standard diluent.

New Neville Island maleic anhydride plant, Pittsburgh Chemical Co.

$6,000,000 an hour night and day...

That's what the Chemical Processing Industries will spend in 1961 . . . every hour, every day. And a sizable chunk of it will wind up in equipment, much of it stainless steel, of course. For stainless is the one metal that can stretch the life span of new equipment beyond mere recovery of the initial investment.

This deceptively simple truth is highly important in an industry where process obsolescence is probable in 10 years or less, where a new process must pay for itself, and quickly . . . without expensive maintenance, without revenue loss from contaminated product, without loss of production from repeated equipment failure.

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3648

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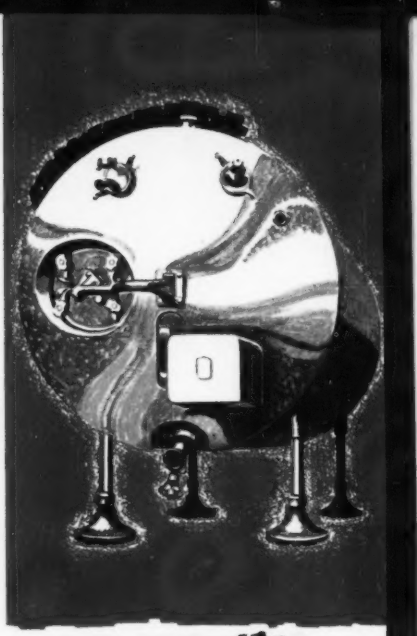

PIPE & TUBING—seamless, welded, or metallurgically bonded composite products, and the widest range of standard stainless types and special, high temperature alloys in the business. And A-L maintains a large, flexible stocking program of finished products, plus semi-finished billet and strip inventories for you. **SHEET & STRIP**—the quality standard of the stainless industry. A-L's integrated facilities and tight process controls insure identical analyses on every shipment, plus a gage rolled right on the button . . . order after order. And Allegheny Ludlum has earned a reputation as the mill source with thousands of tons of sheet and strip in stock, much of it at finish gages for overnight delivery. For polishing quality, for second-to-none formability, for the lowest fabrication rejection rate and the highest on-time delivery record . . . *nothing* can approach the sheet and strip by Allegheny Ludlum. **WIRE**—stainless in one of its most useful forms . . . for woven belting, baskets, and screen cloth, for cold headed fasteners and braided hose, for springs and mechanisms, for racks and shelving that can live in any environment, for fool-proof, fail-proof controls and rigging, for incredible strength in the smallest diameters. **FORGINGS**—rough billet stock, finished or semi-finished custom components, shaped to your specific requirements. For strength, hardness, and endurance where nothing less than the finest can be tolerated . . . Allegheny Stainless. **BARS**—the ultimate in machinability and chemistry balance for any application. Superbly finished, perfectly sized, and ready for shaping to your needs, stainless bars are among the finest products of the Allegheny mills. **PLATE**—for problems of big volumes and high pressures . . . for the corrosion, oxidation, and contamination so common to chemical processing . . . the massive workhorse of the stainless line. Solid stainless or clad stainless . . . the finest you can buy is Allegheny Stainless.

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AL® ALLEGHENY LUDLUM

Technology
Newsletter

CHEMICAL WEEK
December 2, 1961

Watch for Hooker Chemical to emerge as a new entry in the sodium borohydride pulp and paper bleaching field. Unofficial word is that the U.S. Patent Office has approved the firm's application for a patent on the use of sodium borohydride with chlorine dioxide to prevent color reversion in highly bleached paper or cotton. The patent, expected to issue soon, would be the U.S. counterpart of Canadian patent 610,654 assigned by W. H. Rapson to Electric Reduction Co. of Canada, Ltd.

This could be a key piece in the jig-saw of recent sodium borohydride developments. For example, Metal Hydrides teamed up with Mo och Domsjo Aktiebolag (Sweden) for development of sodium borohydride in the pulp and paper field (*CW Technology Newsletter, Sept. 16*). This gives MHI the right to administer licenses owned by MODO in the U.S. Earlier, MHI had cut the price of sodium borohydride to about $7.50/lb. (carload quantities) for stabilized solutions (*CW Market Newsletter, July 22*).

It's too early to determine how sodium borohydride will fit into the bleaching of pulp. The work done by Rapson—a process to which Hooker will doubtless obtain rights—deals with increasing brightness of cellulose materials and increasing their resistance to yellowing with age. The mechanism by which it works has not been established. But Rapson theorizes that yellowing is caused by incidental oxidation of cellulose to form carbonyls (e.g., aldehydes), which absorb certain wave lengths of light, causing the material to take on a yellow tinge. The treatment with borohydride reduces these carbonyls to hydroxyls.

Proponents of borohydride bleaching expect the process to be a standard mill practice in 10 years. The drawback now is its high price, even at the drastically reduced tags. It's felt that the material will have to approach the $1/lb. tab before it can win wide acceptance among pulpers. That's not an impossible target though. When Metal Hydrides dedicated its Danvers, Mass., plant to make sodium borohydride for the Navy, it stated flatly "that borohydride can now be made to sell for $3-5/lb." and said eventual price would be in the $1-2/lb. range (*CW, Oct. 5, '57, p. 22*).

•

A glowing estimate of the future of cesium in electric propulsion and thermionic conversion should be scaled down. Ernst Stuhlinger, director of the Research Projects Division of National Aeronautics and Space Administration's George C. Marshall Space Flight Center (Huntsville, Ala.), was widely quoted as having estimated cesium use at 1 million lbs./-year by '65 (*CW, Sept. 9, p. 105*). But Stuhlinger told *CW* last week "I was misquoted."

This is the more realistic timetable, he suggests: cesium use in '61 will probably amount to 400 lbs. It will grow to 600 lbs. next year and

to 1,000 lbs. in '63 and '64. Between '65 and '70 it will reach 2,000 lbs./-year, and after '70 it will range from 20,000 to 200,000 lbs./year.

•

An all-tantalum pump is being shown this week at the Exposition of Chemical Industries (Chemshow) in New York by Fansteel Metallurgical Corp. It was developed jointly by Fansteel and R. S. Corcoran Co. (Joliet, Ill.). This means, says Fansteel, that processors can now employ an all-tantalum circuit for highly corrosive acids, using previously available tantalum tubing, valves, heat exchangers.

•

Construction of TVA's big rotating electric phosphorus furnace is under way at the agency's Fertilizer-Munitions Development Center at Muscle Shoals, Ala. It's expected to be in production early in '63, will cost $3 million, have a capacity of 16-17,000 tons/year of elemental phosphorus.

TVA built the first rotating furnace in the U. S. in '47, a 6,000-tons/year unit that's still in operation. One advantage of the rotating—over the stationary—models, says TVA, is a greatly extended life for the carbon block lining.

The new unit will incorporate modern technology and is expected to reduce production costs—through lower labor cost per unit, less maintenance, less electricity. It will replace several older units, therefore will not add to TVA's over-all production (*see TVA annual figures, p. 65*).

•

A patent on columbium steel has been received by Great Lakes Division of National Steel, U. S. patent 3,010,822 covers a columbium-additive grain-size refining formula, the process for making the steel and all mill products producible from the invention. Columbium steel (*CW, Oct. 18, p. 101*) has been highly touted for some time. But so far it has won more attention than markets.

•

The first large plates of Hastelloy Alloy N have been produced by Lukens Steel (Coatesville, Pa.) for the fuel containment vessel of a new circulating-fuel reactor at Oak Ridge National Laboratories. The largest plate, 324 x 77 in., is 0.360 in. thick and weighs 2,800 lbs. Previous production had been on a small-scale basis. The nickel-base alloy (containing 6-8% chromium, 15-18% molybdenum and a maximum of 5% iron) was developed during an effort to find a metal for use in compact nuclear power plants that would withstand the attack of highly corrosive fused fluorides that contain uranium.

•

The Soviets are interested in rhenium disilicide as a high-melting semiconductor. A group of scientists report that the material was prepared in a resistance furnace by sintering rhenium and silicon powders for three hours at 133 C in an argon atmosphere. Stoichiometric quantities of the starting materials were employed. The product was powdered by hot pressing in an argon atmosphere at 1600 C and 200-kg./sq.mm. pressure.

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Kelly: 'Visit your congressman.'

McGuire: 'Try a government job.'

Whyte: 'Take politics courses.'

Ryerson: 'Help solve problems.'

CW PHOTOS—JOAN SYDLOW

Making Friends on the Hill

Chemical businessmen last week were exhorted to show more interest in, and to exert more influence on, government. Speakers at the semiannual meeting* of the Manufacturing Chemists' Assn. in New York insist that this is essential if unprecedentedly stiff taxes and controls are to be fended off.

MCA President John Hull observed that 58 federal bills pending in the House Ways & Means Committee and 13 now awaiting action in the Senate Finance Committee have "special significance" to the industry. He warned of the cost to companies of recent and pending legislation at all levels of government (e.g., it cost companies an estimated $1 million to assemble scientific data leading to the recent ruling by the Food & Drug Administration that cleared polyethylene as a packaging material for foods).

Hull says the trend is toward more government control over the business economy, and there is no possibility of stopping it. But he scorns passive tactics, urges greater participation of company management men in municipal, state and national affairs.

Action Plan: Robert Kelly, manager of Du Pont's legislative services, offered the meeting do's and don'ts for influencing senators and congressmen. Among them: "If it is a legislative matter you are pursuing, try to meet the legislative assistant. Most senators have one; and in the House, where office staffs are smaller, someone usually serves in this capacity along with his other duties." Unless the issue is clear-cut, "don't insist that a member publicly state his position while a bill is still pending before a committee. Many legislative items are almost completely emasculated between the time of introduction and final action."

And Kelly cautions against making critical public appraisals of Congress: "Despite what you may read or hear, the Senate has a fraternal spirit and there is a certain camaraderie that exists among its members, not always apparent outside the cloak rooms." He suggests continued liaison with Capitol Hill, feels that a once-a-year visit to a Congressional office is "a very thoughtful gesture."

Both Sides: Former (under Eisenhower) Assistant Secretary of Defense (Logistics) Perkins McGuire told the MCA panel on industry-government relations that both business and government can — and should — do many things better. He says a tour in government is valuable in broadening and maturing younger executives, but he admits it is a problem to ". . . get them at government salaries at the period of their lives when they need income the most." In particular, McGuire would like to see industry, in its local areas of operation, recommend to congressmen contracts that might be curtailed or installations that could be shut down.

William Whyte, assistant vice-president (Washington) of U.S. Steel Corp., advised management men to: (1) issue a policy statement endorsing participation of personnel in political and public affairs; (2) enroll in practical politics courses (U.S. Steel has put 4,000 staffers through such a program); (3) take active interest in a political party (e.g., by raising money, finding candidates); (4) know the elected officials who represent individuals in the company at all levels of government; and (5) make their thoughts known to these representatives (write letters, etc.) but limit the amount of legislation in which they take interest ("We at U.S. Steel can follow only three to five major bills at one time.") He advises small companies to show their interest in legislation, because "a little voice is better received in Washington than a big voice."

John Ryerson, senior editor of the *Kiplinger Washington Letter*, believes "there's an inherent reluctance, and in many cases a real inability, on the part of businessmen to put their views over. Many of them aren't called on in their daily operations to explain things. And when they are, it is inside the family, to those who already know what it is all about. In this same vein, most businessmen have a fear of publicity — many times for good rea-

* Panel subjects: Taxation and Depreciation; Federal Labeling Act and Regulations; The Investor Looks at the Chemical Industry; Industry-Government Relations; Mental Health in Industry; Mergers, Joint Ventures, and Product Integration.

sons. But the trouble is that their fear shows through."

His prescription for healthier industry-government relations is for businessmen to "stop talking into a mirror" (e.g., only to their friends), "tackle the enemy" (e.g., congressmen), and "learn the political facts of life." Says Ryerson, congressmen and government officials must consider the political impact of issues and problems. The inability of businessmen to recognize this is a major reason for much friction between government and business.

"A businessman who goes into government service," says Ryerson, "must recognize that he cannot tell off the appropriations committee that decides how much money he is going to get, the same way he might tell off some group inside his own private operation. Yet this has happened over the years. Government service is different from business and cannot be run the same as a private enterprise, no matter how many times businessmen say it can."

He dislikes the "negative attitude" business often displays toward government problems, invites industry to come up with plans that may help solve a particular problem—rather than merely reject the government's solution.

Like it or not, the panelists agree, business and government are now inseparable partners. The trick is to make the most of the marriage.

Employees Cash In

Eastman Kodak will distribute a $50.9-million wage dividend to 46,000 employees; and Dow Chemical has a new plan whereby salaried employees may earn cash awards "in recognition of outstanding contributions."

The Kodak workers will receive cash or have the money deposited for their benefit in the Eastman Kodak Employees Savings and Investment Plan. The wage dividend, which is subject to authorization by the directors each year, is based on the cash dividends declared on the common stock during the year and on individuals' earnings over the five years preceding the payment date. It is in addition to regular wages. Eligible workers will get $36.55 for each $1,000 earned during '57-'61).

Under Dow's "Cash Award Plan," employees at the parent company and at Dow subsidiaries will be eligible. Officers and directors are excluded. Cash payments may range up to a maximum of three months' salary for the employee concerned. The plan is optional and may be used at the discretion of the division manager or company department head.

LABOR

Labor's Choice: Du Pont production and maintenance employees at Niagara Falls, N.Y., rejected the International Assn. of Machinists (AFL-CIO) and voted to retain the Independent Niagara Plant Employees Union as bargaining agent. The latter has represented employees at the Du Pont plant for about 20 years. The election was requested by IAM and conducted by the Buffalo regional office of the National Labor Relations Board.

• United Steelworkers of America (Canadian Labour Congress) claims victory in a drive to oust a rival union from International Nickel Co. plants in Port Colborne, Ont. A United Steelworkers spokesman says the union has signed about 60% of the 1,900 members of Port Colborne's Local 637, International Union of Mine, Mill and Smelter Workers (Ind.). United Steelworkers also won an NLRB recognition election at the Wah Chang Metals Corp. (Albany, Ore.) and is carrying on intensive recruiting drives at Mine-Mill locals in Thompson, Man.

•

Settlements: Norton Co. of Canada, Ltd. (Hamilton, Ont.), and Local 3696, United Steelworkers of America, have agreed on a new, two-year contract including a 12½¢/hour package wage boost. An initial 5¢/hour increase brought the minimum rate for men to $1.97/hour; for women, to $1.70/hour. A second 5¢/hour boost takes effect Nov. 1, '62.

• Management of Longhorn Division of Thiokol Chemical Corp. at Longhorn Ordnance Works (near Marshall, Tex.) and representatives of three labor unions have agreed on a 7¢/hour wage increase. The new contract, effective for one year, also provides for limited powers for arbitrators, revised seniority for certain employees and changes in contract language.

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Product Ban: The state of Pennsylvania has barred the manufacture and use of β-naphthylamine, a coal-tar product used in dye manufacturing, charging that it causes cancer of the bladder. Reports of several hundred cases of bladder cancer in workers handling the product prompted the move. Manufacture of the product is now prohibited in Germany, Switzerland and England but continues in Italy, Japan and Czechoslovakia. Dr. Charles Wilbar, state health secretary, said he believes Pennsylvania is the first state to ban the compound.

•

Union Merger: Merger of two districts of Oil, Chemical & Atomic Workers may shift central headquarters for 19,000 union members from Tulsa, Okla., to Joplin, Mo. Merging of the union's District 8 (Missouri and Arkansas) and District 5 (Kansas and Oklahoma) was expected at a meeting of 250 delegate-members of the two districts.

LEGAL

Fluoridation O.K.: Voters in West Memphis, Ark., have approved fluoridation of the community's water.

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Mineral Leasing: The Interior Dept. has proposed a new extension of mineral leasing rules, to include asphalt, bituminous rock, and oil-impregnated rock and sand. The changes extend the principles of multiple-use management to mineral development on public lands. Interested parties have 30 days (from Nov. 21) to file comments with the Director of the Bureau of Land Management (Washington, D.C.).

•

Damage Suit: U.S. district court in Greenville, S.C., has returned a verdict for Texize Chemicals, Inc., defendant in a $300,000 damage suit brought by Billy Joe Wooldridge of Little Rock, Ark. Wooldridge claimed a chemical cleaner made by Texize had entered, and caused loss of, his right eye. He contended the firm was negligent in putting the solution in a plastic squeeze-type bottle without listing adequate instructions for its use.

KEY CHANGES

William W. Wright to executive vice-president; **Robert M. Ward** to vice-president, Beckman Instruments, Inc. (Fullerton, Calif.).

Kenneth E. Cosslett to director of international operations, U. S. Industrial Chemicals Co. (New York), division of National Distillers and Chemical Corp.

Leland A. Doan to board of directors, Brazos Oil and Gas Co. (Houston), division of Dow Chemical Co.

Philip B. Dalton to director of marketing, Antara Chemicals Division, General Aniline & Film Corp. (New York).

William A. Moody to secretary, Tennessee Products & Chemical Corp. (Nashville, Tenn.).

Joseph G. Leone, Robert E. Kenim to executive vice-presidents, Wheaton Industries, Inc. (Millville, N.J.), maker of plastic and glass containers.

Wilton E. Scott to president and director, Tenneco Oil Co. (Houston).

George M. Elsey to assistant to the president, The M. W. Kellogg Co. (New York), chemical plant builder.

George J. Sella, Jr., to manager, rubber chemicals department, American Cyanamid Co. (Bound Brook, N.J.).

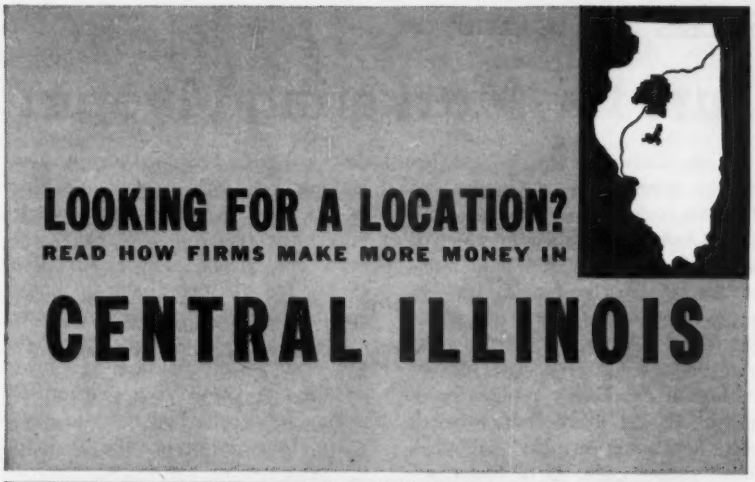
Roy E. Nelson to president and a director, American Gilsonite Co. (Salt Lake City), producer of hydrocarbons.

John R. Stoddard to president; **Ernest W. Rivers** to vice-president, Monaco Chemical Industries (New York), chemical distributor.

Paul B. Wishart to chairman of the board and chief executive officer; **James H. Binger** to president; **Stephen F. Keating** to executive vice-president, Minneapolis-Honeywell Regulator Co. (Minneapolis, Minn.).

KUDOS

Charles S. Munson, chairman of the board of Air Reduction Co., Inc. (New York), to honorary director, Manufacturing Chemists' Assn., Inc. (Washington, D.C.).



Muirson Label Company first selected Peoria as a profit-making location in 1930. Expansion required a new plant in 1961 — and again Muirson chose Peoria, building in the new Pioneer Industrial Park to serve label and printing customers throughout the U.S., Canada, Mexico and overseas.

Nutrena Mills, Inc. finds a double advantage in a Central Illinois location. The by-products of nearby industries provide ingredients for livestock feeds, easily distributed from the Peoria "highway hub" in the center of one of the world's great agricultural regions.

Chris Hoerr & Son Co. recently occupied a huge, modern food warehouse built in East Peoria, Ill. This company reports that location midway between Chicago and St. Louis means rapid availability of goods, brought in quickly via excellent rail and truck facilities.

LAND IS NOW READY in Central Illinois for any type of plant or warehouse. Write for complete, confidential information on ample labor, power, water, gas, coal and transportation . . . in a metropolitan complex ranking as one of the top 100 U.S. markets.

Mark B. Townsend
Area Development Director

CENTRAL ILLINOIS LIGHT COMPANY
300 Liberty Street PEORIA, ILLINOIS

Cure for 'Marketing Myopia'

Bryton Chemical Co. is just beginning commercial production of 300 base number calcium sulfonate at its Chester, Pa., plant in which it has been producing 300 base number magnesium sulfonate for 18 months. The company's experience with the latter not only led to the new product, but to a new way of looking at marketing problems—an attempt to get away from what it calls "marketing myopia" (although tunnel vision might be a better description).

Bryton (bought by Continental Oil Co. in '53) traditionally regarded itself simply as a maker of natural and synthetic sodium, ammonium and calcium sulfonates for use as lubricating oil additives, cutting oils, dry cleaning soaps, and textile oils. Within these confines (the total sulfonate business is now between $100-150 million/year), the company had developed sales of about $1 million/-year, couldn't see much room for improvement.

But recently it became aware of its growing skill at loading oil with metals—to the degree that it could make the 300 base number materials it now produces (until '52, 10-15 was considered top). The marketing turning point came when it realized that it needn't tie itself exclusively to a limited line of products—that what it should be selling is its "metals in oils" skill.

"Now," says company Sales Manager August Kellermann, "our salesmen go out armed with specifications, prices—and a periodic table." Salesmen, all technically trained, are going to new prospects, in effect taking orders for products that Bryton doesn't at the moment produce. As of now, this has put Bryton into such new fields as extreme high-pressure lubricants, catalysts, and magnetohydrodynamics.

Two Ways: The path Bryton is taking runs counter to the more usual practice of developing a chemical and then seeing if you can sell it. But developing products to fit specific needs is not a new idea. Most companies do it to some degree and some—notably Du Pont—stress this approach.

Says General Aniline & Film Corp.'s Frank Prescott, who is now inviting companies to find uses for its Gantres AN (a water-soluble linear copolymer of methyl vinyl ether and maleic anhydride): "You can find a product to do a specific end-job regardless of whether you're making the raw materials or not; or you can take the products you have and try to capitalize on them by finding new uses. You have to have a lot of money to be able to do it the first way."

What Prescott means is that "the first way" calls for a relatively heavy investment in research.

Advertisements and product literature abound with examples of companies trying the second way. Emery Industries, for example, advertises "Unusual, and often profitable, things happen when you tie into the carboxyl groups at the ends of the long dimer acid chain . . ." Harchem says its sebacic acid can "turn the skeleton of an idea into a lively selling product." The pitch, in short: "We have the product; do you know what to do with it?"

CW PHOTO—JOAN SYDLOW

Bryton's Kellermann: 'Our salesmen go out with . . . a periodic table.'

Bryton, on the other hand, may not have the product, but feels it can probably make it—what would you like? Its current problem: trying to decide whom to ask. At present the company's 3½-man sales force (it shares the use of a man in Europe with the parent company) services a select group of customers, mostly in the oil industry. "Most of our promotion so far has been to simply call upon our accounts—there aren't many," says Kellermann.

Job for Creativity: The company is about to place ads in journals through which it hopes to reach researchers creative enough to think up new products stemming from Bryton's ability to load metals into oil. And Bryton's small sales force will be meeting some new prospects. In the first new series of calls, salesmen will talk to producers of metals, particularly aluminum (because Bryton admires aluminum makers' aggressive search for new markets). The company reasons that the metals producers will know of opportunities for new metal-based products.

The idea that led to the building of the magnesium sulfonate plant came to Bryton via Continental Oil research. Marine engineers were looking for an acid neutralizer; sulfur content of marine fuel oil was creating corrosion problems in the larger marine diesels being used in many foreign-flag ships ("They were ocean-going sulfuric acid plants," says Kellermann). The 300 base number magnesium sulfonate filled the bill and created a new market—Bryton's material is now used on more than 100 ships, almost all of them using the new larger diesel.

Other new developments in power engineering are creating additional applications for "overbased" (i.e., highly loaded with metal) oils—fuel or lubricating. Oil turbines are developing into a large market for magnesium-loaded fuel oils. These oils tend to contain fairly large amounts of vanadium, which in turn tend to form gummy deposits on blades. Magnesium promotes the combustion of these substances to ash, which can be blown away. Says Kellermann cheerfully: "We like these uses—if a product is burned, we figure it's a pretty good application."

Bryton's answer to "marketing myopia" seems to be helping the company get out of a limited business which could be eliminated if "ashless" motor oils (such as Shell is now pushing) become popular. Bryton's hope is that by broadening its marketing vision, it can brighten its business outlook.

More Credit for TVA

Tennessee Valley Authority's annual figures, for the year ending June 30, are now in. As usual they leave many private basic fertilizer material manufacturers feeling that TVA sales all come out of their pockets. And a new gripe has been voiced this year by TVA opponents—it concerns TVA's liberalized credit policy.

The government agency recently declared that fertilizer formulators and distributors participating in the TVA demonstration program may apply for up to 90 days' credit. In the past, payment has been due within 30 days of invoice date.

Breakdown: Last year TVA sold a total of $14.3 million worth of fertilizer. The fertilizer, agricultural, and munitions program required a total net expenditure of $5.5 million. This included $2 million for research on products and processes, $900,000 for farm test demonstrations, $400,000 for basic agronomic research, and $300,000 for other agricultural development activities. TVA produced 252,000 tons of fertilizer at its Muscle Shoals, Ala., plant, sold 235,000 tons of this, used the remainder for educational purposes.

In explaining its new credit policy, TVA points out that 60 days' to 6 months' credit had become widespread in the fertilizer industry. Much of this is informal, the agency says, and its new credit plan may lead the way toward a more orderly credit arrangement, help keep fertilizer companies from getting themselves into financially hazardous positions.

Under the TVA plan, purchasers will pay net for payments within 30 days, get a 1% discount for payment within 15 days, pay 1% more for payment later than 30 days. The plan will apply to shipments made from Sept. 1 through Feb. 28.

Consolidation: This fall, TVA consolidated all of its agricultural and chemical activities at Muscle Shoals. The Agricultural Relations Division, including its administrative offices, the test demonstration, distributor demonstration, and agricultural economics branches, were moved there from Knoxville, Tenn.

Another shift this fall gave the agency's Division of Agricultural Relations a new director. Leland G. Allbaugh, who headed the division for nine years, has retired and the post has been filled by Gerald Williams. He will be responsible for developing and administering plans and projects for evaluating new TVA fertilizers and introducing them to farmers.

The agency reports considerable success in its five-year-old program to allow fertilizer manufacturers to try new TVA fertilizer materials in their own plants. Last year 124 plants took part in the program vs. only 24 in '57, the first year. These plants used a little less than 2,000 tons of the three products offered the first year, used 56,623 tons of the 10 products offered in '61. For the most part, participating plants have been concentrated in the Midwest and South.

Under this plan, some larger manufacturers are encouraged to lead in the adaptation of new processes, products; others work on specific materials and plant problems. Results are available to other interested manufacturers.

Winning Programs: Some of the more important materials to come out of this program have been 10-34-0 (nitrogen - phosphate - potash) liquid base solution, calcium metaphosphate (62-64% P_2O_5); concentrated superphosphate (52-54% P_2O_5), diammonium phosphate (21% nitrogen and 53% phosphate), ammonium phosphate nitrate (30% nitrogen and 10% phosphate), superphosphoric acid (74-75% P_2O_5), and nitric acid (52-58%).

In an older program — the TVA Extension Service test-demonstration farm program — 3,258 farms, in 30 states, participated last year. This program involves supplying farmers with fertilizers at prices low enough to give them an incentive to do what the program requires. The individual farmers agree to try new materials, demonstrate complete fertilization systems recommended by land-grant colleges, plan farm operations and keep records on them, and make their farms available for visits and inspection tours.

Supporters of TVA fertilizer programs such as these insist that they advance the industry as a whole. Opponents, however, who classify TVA with the co-operatives—as unfair competitors, cites the latest report of prosperity and new credit terms as further substantiation of their position.

Come to the Fair

Du Pont's contract for space at the '64-'65 New York World's Fair is the CPI's biggest boost to date for the upcoming exposition. But other chemical process firms have expressed interest—including Eastman Kodak, Aluminum Company of America, S. C. Johnson & Son, and Owens-Corning Fiberglas — indicating that a broad range of chemical products will be on display.

In addition, a number of pharmaceutical and other companies are expected to participate in such multiple-exhibitor pavilions as Hall of Medicine, and the Better Living Pavilion.

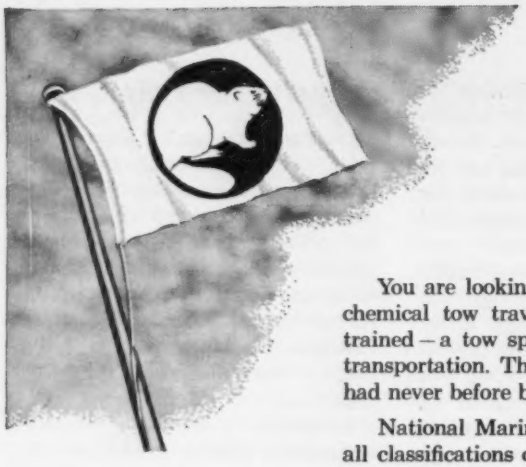
Du Pont tentatively plans to put a 33,678-sq.-ft. circular pavilion on a 46,956-sq.-ft. lot. The exhibit will have four theaters, each with 275 seats, in which continuous performances will tell the story of human progress. The entire exhibit will carry as its theme the role of research in filling human needs. Special ground-floor displays will pinpoint Du Pont's contributions to this work. The function of the exhibit will be divided between institutional advertising and specific product promotion.

The company had an exhibit at the '39-'40 New York fair (theme: Wonder World of Chemistry), used its pavilion to introduce nylon.

Drummer Practice

After deciding it spent too much time and money handling empty drums coming into its Conroe, Tex., plant, Jefferson Chemical Co. conducted a study of the subject, came up with this answer: the company now bands 10 drums together on a truck, picks up the bundle of drums with a fork-lift truck, runs it into the dead drum storage space. It's an obvious solution, but one Jefferson believes hadn't been tried before in the industry.

The firm says the technique reduces a two-hour job to a 20- or 30-minute job, a two-man job to a one-man job. The system also allows the company to use its limited drum storage space more efficiently, because the lift-truck handled drums can be stacked higher than men can reach. Now being developed: a coated band with a coupling device that can be re-used, won't scratch drums.



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Market Newsletter

CHEMICAL WEEK
December 2, 1961

Eastman Chemical's move to bring sales of substandard polyethylene sales into the open is getting a favorable reaction from other producers. Eastman is pricing two grades of low-density PE at 22¢/lb. (5½¢/lb. below prime material) and will sell the plastic without brandname directly to users without recourse to brokers and resellers.

Trade spokesmen agree that this is not a price cut in the usual sense (substandard PE has been cut-rate marketed right along) but is a much-needed move to shunt resellers from this part of the PE business. Some producers complain that resellers have at times "fouled up" the market by squeezing substandard material into film plants, where it has been blended, at over-all cost saving, with top-grade materials; users have then sought lower prices on prime material by claiming that they are getting better price deals from competitive suppliers.

U. S. Industrial Chemicals was one of the first to say officially that it would go along with the Eastman plan—but could not yet say what USI materials would be involved.

•

Strong protests against the U.S. aluminum industry's proposal aimed at controlling international aluminum trade (*CW Washington Newsletter, Nov. 25*) are cropping up on both sides of the Atlantic.

First reactions of French producers of primary aluminum and aluminum semiproducts: the scheme seems to be a "throwback to old cartel methods of carving up world markets and runs counter to present U.S. government projects for freer trade."

In the U.S., aluminum importers are saying that the trade proposal is a device to eliminate effective price competition and that U.S. aluminum producers are losing out on military orders because the firms submit identical bids.

Aluminum exports to the U.S. by two French primary aluminum producers amount to about 30,000 tons this year; the metal was sold for Pechiney and Ugine by their joint sales organization, Aluminum Francais. The Ufalex sales organization exports about 5,000 tons/year of semiproducts to the U.S. from France.

The French price of primary aluminum is a little over 22¢/lb., compared with 24¢/lb. for domestic U.S. aluminum. Price differences between French and U.S. semiproducts are considered "marginal."

•

Dynamite markets won't be permanently shattered by the expected boom in use of ammonium nitrate/fuel oil explosives (*CW Market Newsletter, Nov. 25*), according to explosives marketers in Canada.

Pointing out that these mixed explosives have inherent limitations (poorer fragmentation, need for drilling more holes, greater frequency of

misfires, etc.), a Du Pont spokesman predicts that "dynamite may be in for a bad time for a few years but it should once again return to its 5% long-term growth rate." Reason: use of nitrate/oil explosives "will rise to a peak and fall back somewhat as some operators return to high-density fixed explosives. All we can do is help get that consumption curve over the hump."

Two Canadian fertilizer companies make the ammonium nitrate prills that other firms compound into the mixtures. American Cyanamid of Canada supplies Du Pont with prills, and Consolidated Mining supplies Canadian Industries Ltd. Brockville Chemical (Maitland, Ont.) will soon have prills available and will presumably be involved in Canada's nitrate/-oil explosives business by next year.

•

The U.S. and Britain are drawing the fire of rubber-producing countries because of decisions to suspend price restrictions on sales from strategic stockpiles of rubber. Last month the U.S. General Services Administration informed producer countries that it would start selling up to 5,000 long tons/month of rubber at prices below 32¢/lb. (*CW Washington Newsletter, Nov. 11*). According to a previous sliding scale, pegging amount of sales to market prices, only 800 long tons/month could be sold when prices were in the 29-32¢/lb. range.

Malaya criticizes the U.S. move as tantamount to "economic subversion." Nonetheless the new sales plan will probably be tried out for a year. If market disruption occurs, the plan will be reconsidered.

A 2¢/lb. price cut on polyisoprene synthetic rubber last week by Shell Chemical also reflects the worldwide rubber price slump. The synthetic—similar to natural rubber—will sell at 23¢/lb. f.o.b. Torrance, Calif., and at 24.1¢/lb. delivered.

The cut is attributed to decline of natural rubber prices to less than 28¢/lb. in New York following the General Service Administration's move to sell more stockpiled rubber.

•

FMC Corp. is marketing maleic anhydride now being produced by Petro-Tex Chemical Corp. (Houston, Tex.), jointly owned by FMC and Tennessee Gas Transmission Co.

FMC's aim in cracking the tough maleic anhydride-fumaric acid market will be to stress "reliability" of maleic supplies not dependent on benzene as raw material. Maleic buyers will be reminded of past benzene shortages while being told that Petro-Tex's maleic process uses another route—direct oxidation of butylenes (*see also p. 75*).

FMC will also market Petro-Tex's tetra- and hexahydrophthalic anhydrides (mainly for polyester production). Fumaric acid will become available sometime in '62.

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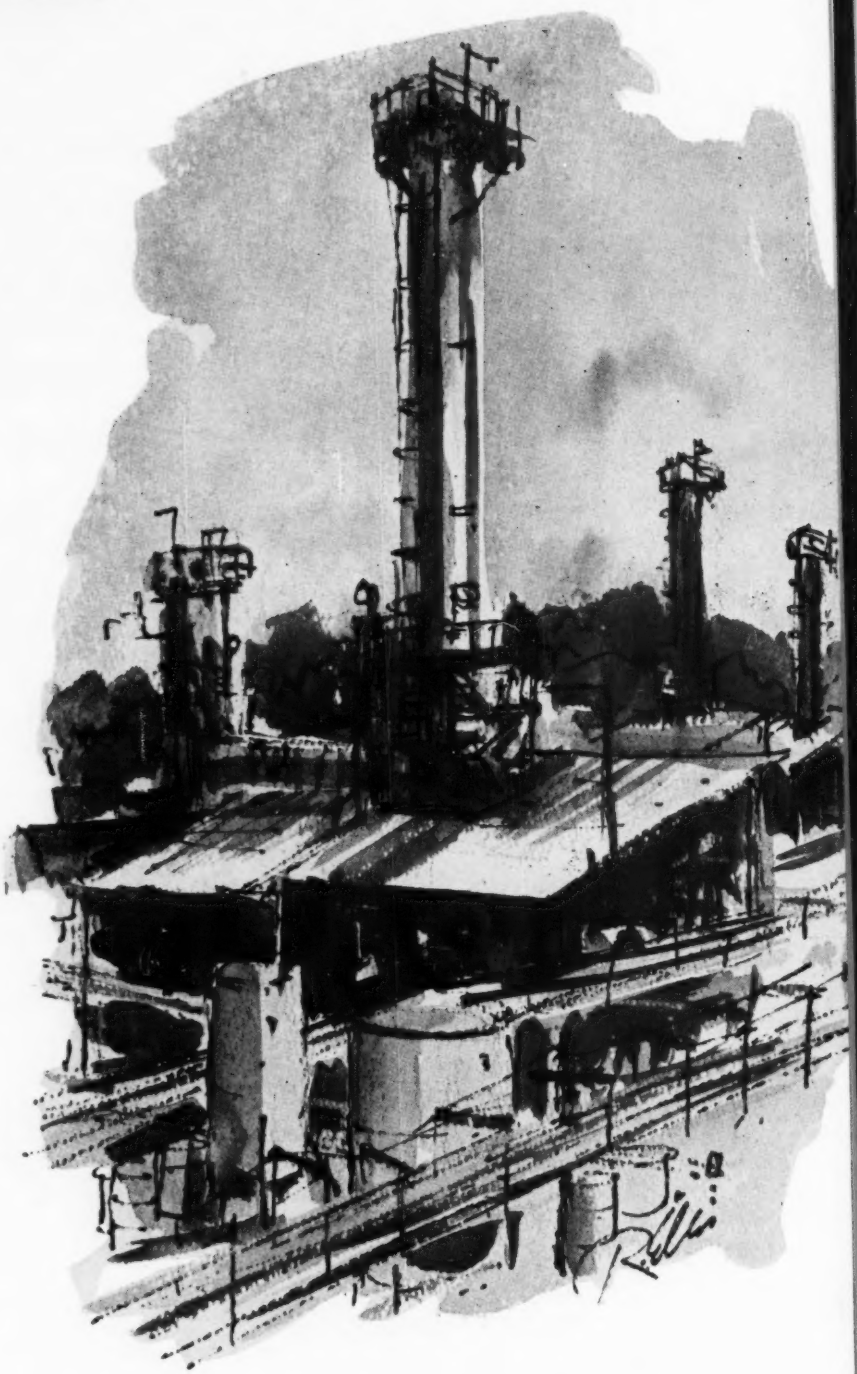

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Potash—Optimism Amid Oversupply

The potash supply-demand balance maintained over the past few years will be upset soon. Serious overcapacity is ahead as producers continue to push new expansion projects in the U.S. and Canada. These expansions will account for a 15% capacity increase in '62 and a further, 48% boost by '64.

Nevertheless, potash producers are optimistic. They're pinning hopes on a healthier export market, along with greater domestic demand, to chew up any additional output. Right now, though, it seems unlikely that demand will expand sufficiently to absorb the new production, and a weakening in the price structure could develop.

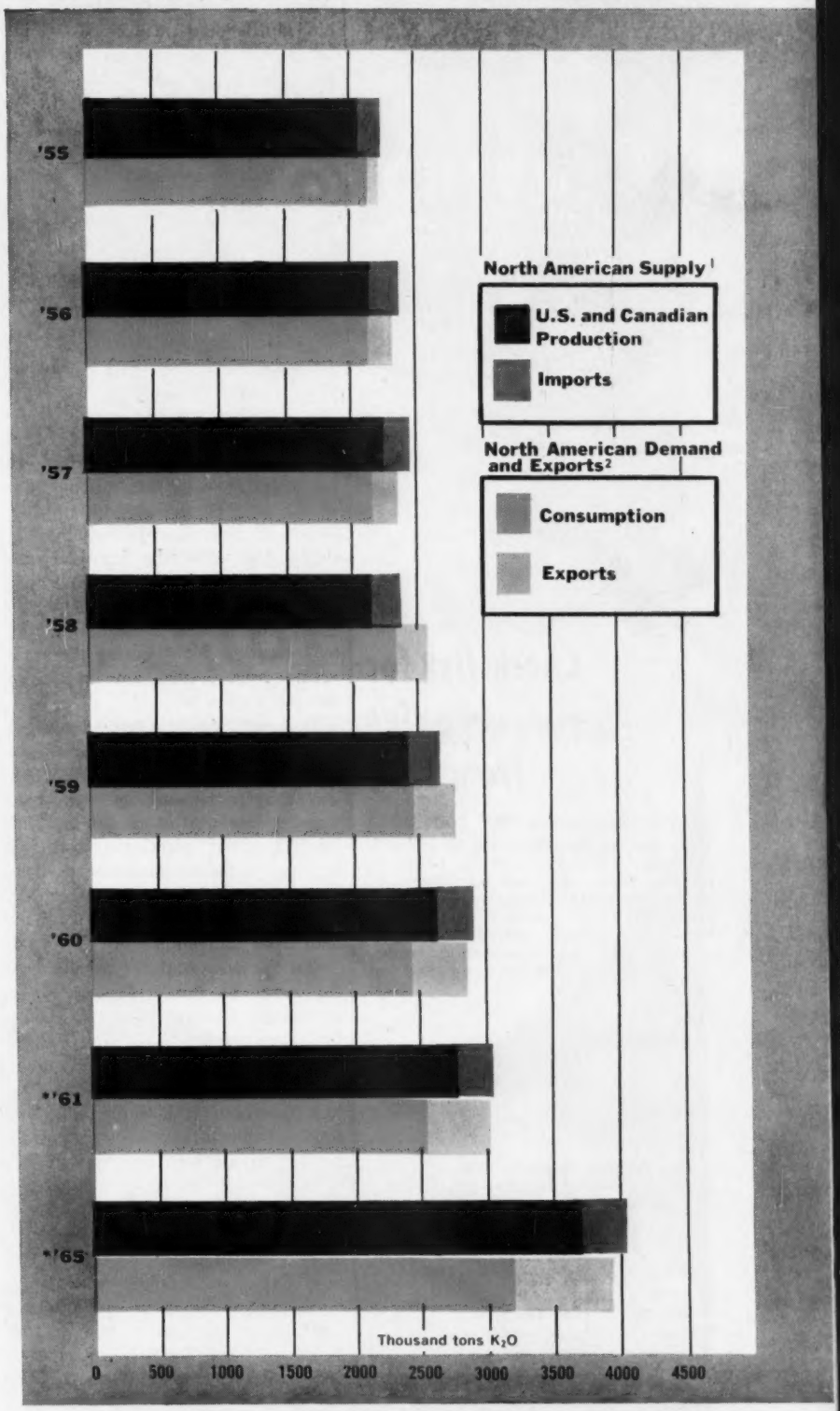
Overcapacity is expected to become acute during '63, when combined U.S.-Canadian potential will reach 4.5 million tons/year (in terms of K_2O). Meanwhile, North American demand—including consumption and exports—is anticipated to be only 3.5 million tons.

Counting Up Capacity: Although potash producers are reluctant to discuss their capacities, it's estimated that present domestic potential is about 2.8 million tons/year. In the next three years, three new projects will add 1.7 million tons/year.

International Minerals & Chemical Corp. reports that its new plant at Esterhazy, Sask., will be producing at the rate of 420,000 tons/year by late spring '62 and at a rate of 720,000 tons/year by Jan. '63. Potash Co. of America at Saskatoon, Sask., is expected to be in operation in '63-'64, producing at the rate of 320,000 tons/year. And Texas Gulf Sulphur Co. is planning to produce at the rate of 600-700,000 tons/year at Moab, Utah, by '63.

In addition, other companies not

Potash outlook: growing demand, fatter export market.



Sources: Bureau of Mines; American Potash Institute. (1) U.S., Canada, Cuba, Hawaii and Puerto Rico. (2) To countries other than North American countries listed. *CW estimates.

now in production are conducting exploratory drillings. If they proceed on a commercial scale, their plants could further raise domestic capacity. Included: Standard Chemical Co. (jointly owned by Armour Chemical Co. and Pittsburgh Plate Glass Co.), at Moosejaw, Sask.; U.S. Borax & Chemical Corp. and Homestake Mining Co., which are jointly studying sites in Saskatchewan; San Jacinto Petroleum Corp., at Cane Creek, Utah; Superior Oil Co., in San Juan County, Utah; and Farm Chemical Resources Development Corp., in Lea County, New Mexico.

Over the past five years the balance of potash supply and demand in North America (including U.S., Canada, Cuba, Hawaii and Puerto Rico) has seesawed—in three of these years demand was greater than supply. Production increased at the rate of 5.5%/year, from 2.1 million tons in '55 to 2.6 million tons in '60. Domestic deliveries increased at a slower rate—3%/year from 2.1 million tons in '55 to 2.4 million tons in '60. But exports more than made up for the slower consumption rate by increasing 505% during the same period from 73,000 tons in '55 to 441,000 tons in '60.

Demand: Domestic deliveries in '60 dropped 1%, to 2.44 million tons from 2.46 million tons in '59. This was due to abnormally wet, cold weather over most of the country during the spring planting season and because the federal government's farm program removed approximately 25 million acres of corn and sorghum land from cultivation.

But the latest statistics compiled by the American Potash Institute show a demand increase of 1.8% in the first nine months of '61 and a 91% increase in third-quarter '61, compared with demand in the same periods last year. It is anticipated that total '61 domestic requirements will be 2.5 million tons and rise to 3.2 million tons in '65.

Pricing Problems: In the '57-58 fertilizer season, potash was priced at 34¢/unit K_2O. In anticipation of new Canadian supplies—which did not materialize—prices dropped to 30¢/unit in the '58-'59 and '59-'60 season. As the supply/demand balance tightened again, prices rose in '60-'61 to 33¢/unit, and to 35¢/unit in '61-'62.

North American Potash Producers

EXISTING	Capacity (thousand tons as K_2O)
American Potash & Chemical Corp. Trona, Calif.	225
Bonneville Ltd. Wendover, Utah	50
Duval Sulphur & Potash Co. Carlsbad, N.M.	300
International Minerals & Chemical Corp. Carlsbad, N.M.	375
National Potash Co. Carlsbad, N.M.	275-285
Potash Co. of America Carlsbad, N.M.	575
Southwest Potash Corp. Carlsbad, N.M.	425
U.S. Borax & Chemical Corp. Carlsbad, N.M.	540
PLANNED	
International Minerals & Chemical Corp. Esterhazy, Sask.	420 by '62 720 by '63
Potash Co. of America Saskatoon, Sask.	320 by '63-'64
Texas Gulf Sulphur Moab, Utah.	600-700 by '63

When Canadian potash begins to appear on the market in '62 prices will likely tumble again to 32-33¢/unit, remain there until supply/demand stabilizes.

Wide-World Look: Demand (in non-Communist countries) has increased at the rate of 5.1%/year in the last five years. Figures are not available for the '60 calendar year but *CW* estimates consumption was about 6.7 million tons that year and will rise to 8.8 million tons by '65.

Western Europe has an annual capacity of about 4.3 million tons. Improvements in processing will hike this to 5 million tons/year. However, these improvements will be offset by declining ore reserves and more difficult mining operations. Israel and Jordan have potash ore reserves with a rated capacity of 400-600,000 tons/year. Total capacity in non-Commu-

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nist countries is 7.4 million tons/year and will be 10.1 million tons by '65.

Exports: Western countries' productive capacity (excluding that of North America) will have reached its maximum by '63. It is obvious then that the North American expansions are aimed squarely at this export market. As T. M. Ware, president of International Minerals & Chemical, puts it, "It is the export picture that will change most rapidly and which will bite biggest into increased North American production. Currently, there is no real selling effort abroad. The demand is already there and growing, but American producers cannot take full advantage of it until they have a product to sell."

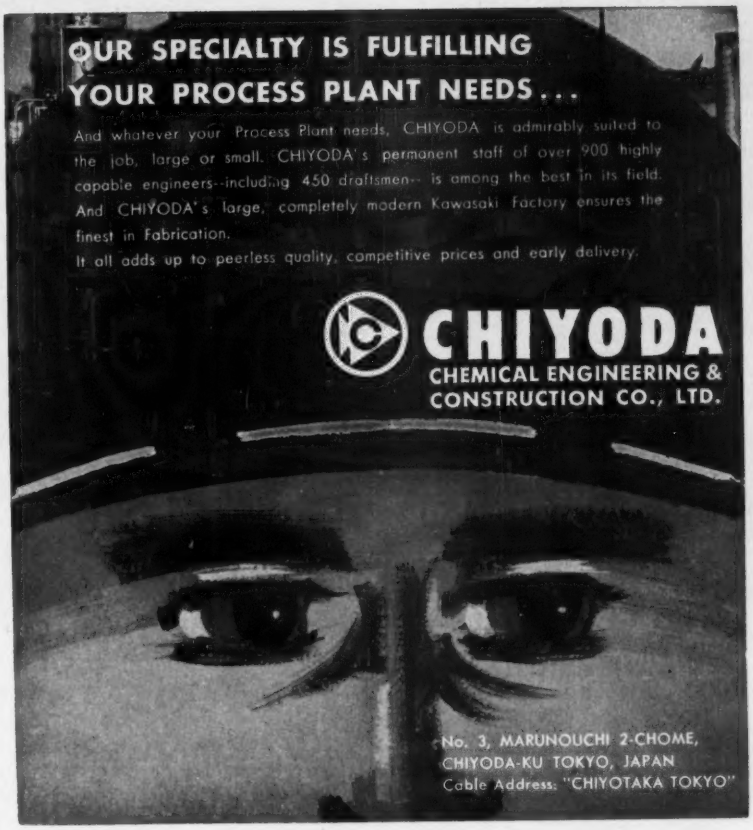
In '60 export sales totaled 441,000 tons, up 37%, from 323,000 tons in '59. *CW* estimates that exports will account for almost 20%, 720,000 tons, of North American production in '65.

Of total exports in '60 Japan took the greatest share—318,000 tons, up 58% from 200,000 tons in '59—and this comprised 72% of total North American overseas shipments. Only 32,000 tons of potash—totaling 7.3% of exports—went to Europe. But this was an increase of 161% over shipments received in '59.

Red Potash: The Russian potash picture is rather cloudy. In recent years the Soviet reportedly has discovered vast reserves on the eastern side of the Urals but apparently has not begun to work them to any extent. It is doubtful that Russia will disrupt world potash markets, since it requires the material for its own use. Moreover, Red China, where agricultural troubles are worse than in Russia, would have first claim on Russian fertilizer potash.

Meanwhile, other Communist countries are expected to be hard pressed to supply their own needs while meeting additional Russian requirements.

Outlook: Since 40% of the world's population are on substandard diets, the need for plant nutrients will continue to grow. For North American potash producers the biggest potential export markets will be Asia, Africa and South America. Domestically, potash demand will continue high but will be influenced by increasing government removal of crop acreage. Meanwhile, near-term overcapacity will cause some price weakness.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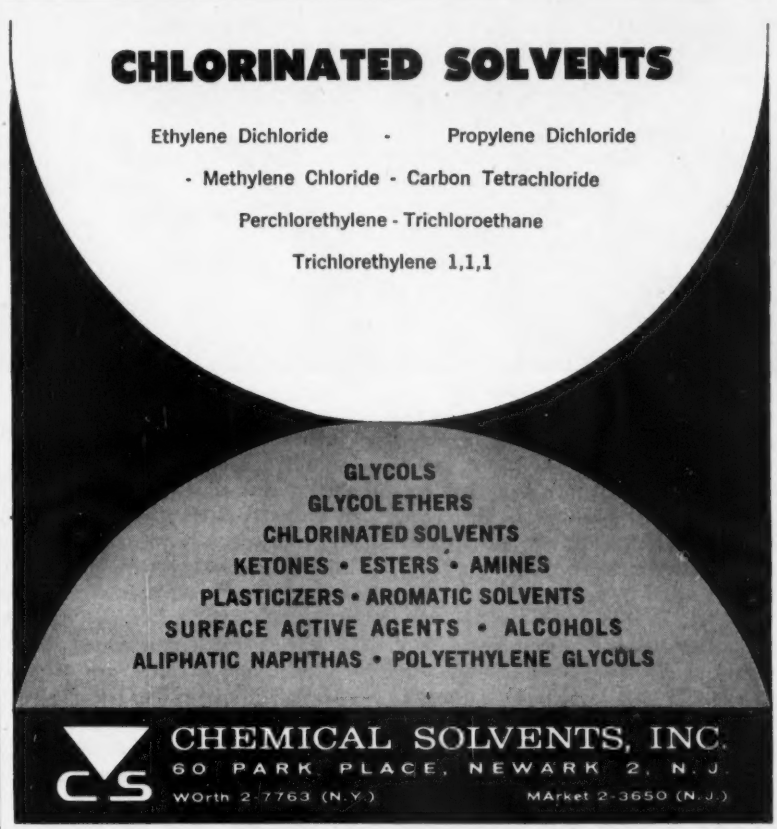

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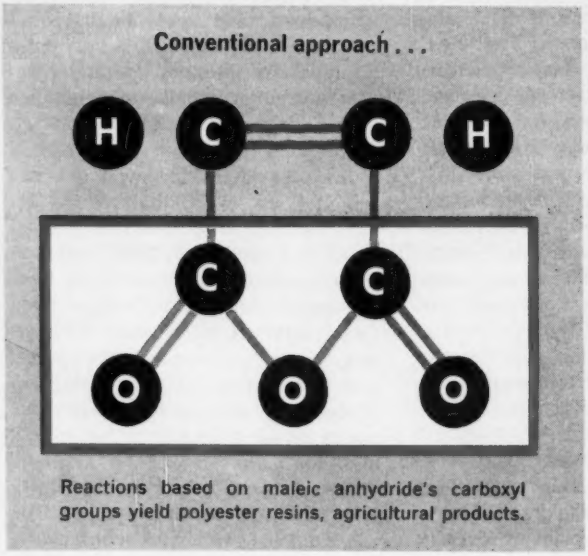
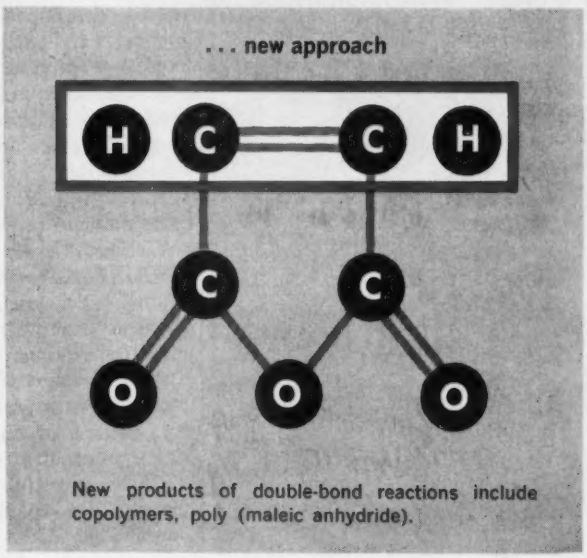
Double Bond Is Backbone of New Maleic Reactions



Reactions based on maleic anhydride's carboxyl groups yield polyester resins, agricultural products.



New products of double-bond reactions include copolymers, poly (maleic anhydride).

Building New Markets for Maleic

The penny that was chipped off the price of maleic anhydride last month —it's now 21.5¢/lb. in bulk—was just one phase of a broad new effort to fatten maleic markets. Other—and likely more effective—sales expanders will be brand-new applications emerging from the research lab. Many of the new applications stem from a novel approach: reactions involving maleic's carbon-carbon double bond, rather than on its acid (carboxyl) groups.

The approach through this double bond has already produced a raft of new products of both experimental and commercial types: polymaleic anhydride, a lab compound that holds intriguing potentialities in uses now sealed up by polyacrylic acid derivatives; commercial copolymers of the sort typified by General Aniline & Film's Gantrez AN (*see p. 64*); and modified rubber products.

Maleic's carbon-carbon bond is not, of course, a new discovery—producers of the anhydride have always pushed the application of all three of maleic's functional groups. Conventionally, though, many of maleic's biggest uses—including polyesters and pesticides—have been made by first reacting one or both carboxyl groups, then cross-linking through the double bonds. Now, by first reacting through maleic's double bond, a carbon backbone is formed instead of an esterified structure based on carboxyl groups.

Polymer Surprise: Just how far this noncarboxyl reaction could be carried is only lately coming to light. The homopolymer of maleic anhydride, for example, long considered impossible to make, was recently synthesized. The three men who did it: John Lang of Koppers, W. A. Pavelich of Spencer Chemical, and H. D. Clarey of Dow Chemical. They began their work when all three were at Dow.

Key to the polymerization is gamma radiation (from cobalt-60), used to initiate the reaction. The product: a maleic anhydride polymer of 23,000 molecular weight. The polymer has properties that could well prove commercially fruitful—unusual solubilities, a high proportion of reactive centers and a possible cost advantage over other polyacids.

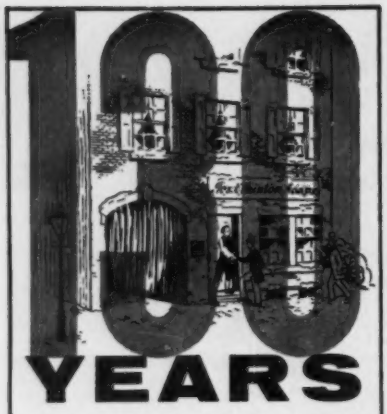
In contrast with other polybasic acids, which form soluble salts when reacted with monovalent elements (e.g., lithium, sodium and potassium), the polymaleic produces quasiprecipitates (jelly-like substances) instead of forming the usual soluble salt. On reaction with barium, the maleic polymer salt is soluble.

Striking feature of the homopolymer: for each carbon atom along the chain, there is a reactive carboxyl group. This high number of reactive centers is almost unmatched by commercial products.

The market opportunity for the new polymer is still only a matter of speculation. High-density polyacids are one possibility. These might have a plus over acrylics, since the acrylics have only one carboxyl group—rather than two—in each monomer unit.

By substituting at the reactive groups on the chain, polyester-like materials are feasible. Other derivatives (e.g., polyhydrazides) could find application in agricultural uses. And the polymer shows similarity to those used in certain biochemical reactions. But basically the polymaleic anhydride market could be the field now covered by the acrylics—floor polish emulsions, waxes, thickeners.

New Copolymers: Breaking the backbone double bond to link maleic with other molecules is already a commercial technique. General Aniline, for example, makes its Gantrez AN by joining methyl ether with maleic an-



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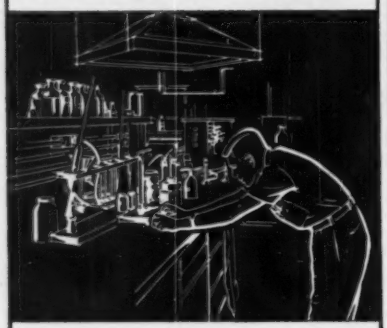

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hydride (*CW Technology Newsletter, May 27*); it contains 63% by weight maleic anhydride. Now in semicommercial production, the copolymer is only the first of a series of water-soluble polymers and copolymers GAF expects to produce. The copolymers will be based on maleic anhydride and products of high-pressure acetylene chemicals. Next out will be maleic copolymerized with a low alkyl vinyl ether.

By putting maleic anhydride's reactive carboxyl groups into its Gantrez AN, GAF has been able to gain anion characteristics and a hook for other reactants. The ether has qualified the resin for film-forming uses; the anhydride qualified it for esterfication products (it can produce water-insoluble coating raw materials).

The price of Gantrez AN is now $1.25/lb. With full-scale production, though, GAF expects to drop the price down to 80-85¢. A plant to make it will probably be built next year at Calvert City, Ky.

Styrene Partner: Styrene-maleic anhydride copolymers (*CW, March 4, p. 53*) are also getting renewed research attention, especially since Texas Butadiene & Chemical has trimmed the price of its copolymers from 57¢/lb. to 54¢/lb. (*CW Market Newsletter, Nov. 25*).

Monsanto, the largest producer of maleic anhydride, first started producing styrene-maleic copolymers during World War II. It still sells them under the Stymer S name as cellulose acetate sizing and under the Lytron label for floor polishes. A higher degree of reactiveness in the copolymer is now claimed by TB&C for its copolymer. This, it says, is because there are reactive anhydride groups along the relatively low-molecular-weight polymer chain.

But copolymer research isn't stopping here. Another new copolymer may be on the horizon—Monsanto holds British patent 870,398 for esteramides of an ethylene-maleic anhydride copolymer. Potential uses: coating resins, synthetic varnish or drying oils.

New Areas: Relatively unimportant maleic uses today (e.g., rubber applications) that are also based on the double-bond reaction are actively being studied by maleic anhydride producers.

At least a dozen rubber producers are researching the possibility of further copolymerizing polybutadiene or polyisoprene with maleic. (This is done to some degree now.) The product bonds with rubber better than does nylon itself, and could be used in nylon tires. Maleic has two basic applications here—in the vulcanization process and in adding polar groups to the conventional rubber-forming monomers.

However, several investigators have run into snags. For example, J. R. Little of U.S. Rubber Co. received a patent last June (U.S. 2,989,504) for the vulcanization of rubber using bismaleimides, derivatives of maleic. He found in them some excellent vulcanization properties—e.g., greater resistance to oxidative aging than could be produced by conventional sulfur vulcanization—but the process has a cost disadvantage.

U.S. Rubber Reclaiming Co. (Buffalo, N.Y.) has patented a process for copolymerizing reclaimed rubber with maleic (U.S. 2,879,245). The firm abandoned the scheme when it was found to be uneconomical.

B. F. Goodrich has also tried maleic copolymers. A Goodrich spokesman says, however, that acrylic acid and its derivatives seem to hold more promise for copolymerization, at least with polybutadiene.

Additive Hopefuls: In petroleum applications, maleic is getting considerable new play as a lube oil additive. Several companies now sell an additive based on maleic derivitives (with substitution generally made at the carboxyl site). Esso Research expects a patent soon on a new additive said to involve maleic (it already has a string of patents concerning maleic's derivatives and additive applications).

Current Applications: Maleic's old stand-by uses—e.g. polyesters—are still getting attention. Petro-Tex, for example, with a brand-new plant to make maleic, is pushing butadiene-and-maleic-derived tetrahydrophthalic anhydride. The motive: when substituted for phthalic anhydride, the company claims, it gives alkyd and polyester resins with better initial color and color retention and adhesion, although it costs more than phthalic.

Hexahydrophthalic anhydride, another maleic derivative, is being advanced to the point of finding its way into paints.

Pesticides, another major maleic anhydride outlet, are likely to be expanded

by research. American Cyanamid, for example, now converts maleic into diethyl malenate for its malathion insecticide. New fungicides and cottonseed preservatives may further extend maleic into the agricultural markets.

The Market: Prime incentive for all this research is maleic overcapacity. By '61's end, U.S. companies will be able to make about 250 million lbs./year—but the market is only 100 million lbs./year (*CW, May 13, p. 100*). It's a product for which price alone does not seem to win markets. Already, at 21.5¢/lb., maleic is 7.2¢ per functional group; and 10¢/group is usually regarded as economical by industry.

Further price reduction could be coming. Petro-Tex just put a new maleic anhydride plant onstream at Houston, Tex., that is theoretically more efficient than plants using conventional benzene-based processes (Petro-Tex oxidizes butylene, a raw material that is about half the price of benzene). The plant uses a new patent-pending Petro-Tex process that is now available for licensing.

Regardless of whether the potential lower prices would fatten existing markets, they would at least enhance the chance for commercial debut of the new maleic products now in the labs —and the combination could provide the much-needed easing of the overcapacity problem.

Electronics Payoff

Chemical processing techniques got an indirect boost at the recent Northeast Electronics Research and Engineering meeting in Boston. Agenda topic: progress in electronics materials and microminiaturization.

Two recent developments cited by Radio Corp. of American President John Burns point up the chemical processing-electronics industries tie-in: (1) RCA's creation of a germanium-silicon alloy that's said to have the best practical high-temperature thermoelectric properties yet found in any material (*CW Technology Newsletter, Nov. 25*); (2) RCA's new process for making crystalline columbium-tin for superconducting magnets (*CW, Nov. 25, p. 51*).

Micro Hopes: Work in microminiaturization has gone beyond the individual-components stage; whole circuits are now being incorporated into single pieces of material. In general, familiar materials are being used, including both germanium and silicon, but others are under study. Lockheed Missiles & Space Co. (Sunnyvale, Calif.), for instance, reported to the IRE meeting on developments in chemically fabricating thin-film circuits from titanium and its compounds.

First step is a molten salt process that results in the complete coating of an inorganic substrate with a thick film of high-purity titanium metal. A copper pattern is then applied to provide leads, and the circuit pattern is photoetched in the titanium. A portion of the titanium circuit is then anodically converted into a selected resistive material (one of three forms of titanium oxide), then tested and assembled. The integrated circuits are said to be practical for immediate application.

In other reports, researchers from CBS Laboratories (Stamford, Conn.) estimated that separate active areas as small as ¼ mil in diameter can be made on silicon, and Raytheon Co. (Waltham, Mass.) workers described a stylus tracing method of providing semiconductor surfaces with minute nucleation centers for chemical or electrolytic plating.

A team from A. D. Little, Inc. (Cambridge, Mass.), reported that thin films of normal metals can exhibit some superconducting attributes when placed in direct contact with a superconducting film. And a group from Philco Corp.'s research center (Blue Bell, Pa.) described a new type of solid-state amplifier, called the metallic interface amplifier. Basis: hot electrons can be transported across a thin metallic film and remain distinguishable from the lower-energy electrons in the film.

Materials Status: Work on new semiconducting materials to supplement germanium and silicon in commercial applications has been generally disappointing, according to two of the speakers at the meeting. T. A. Longo of Sylvania Electric Products Inc. (Woburn, Mass.), described the status of compound semiconductor devices as "very preliminary," although he sees an ultimate use for gallium arsenide transistors. Attraction is the possibility of high-temperature operation (above 300 C), but processing techniques are not advanced suf-

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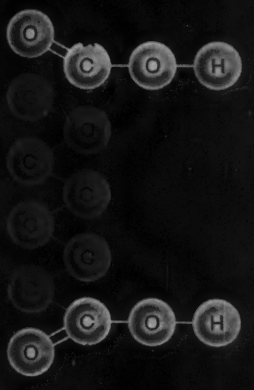

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Raytheon's W. C. Dunlap also sees gallium arsenide as the most promising of the compound semiconductors. Work on silicon carbide, once seen as a promising high-temperature semiconductor, has lagged because of difficulties in producing large enough crystals. Properties of other compounds do not appear to be especially attractive for broad transistor use.

PRODUCTS

Rare Earths: Kleber Laboratories, Inc. (Burbank, Calif.), is making available the complete range of rare-earth metals in high purity. Also available: chlorides, nitrates and sulfates of the rare earths. These salts can be bought as products of either 99%- or 99.9%-purity oxides. The company recently offered selenides of the rare earths and is now offering tellurides.

•

Copper Crystals: Semi-Elements, Inc. (Saxonburg, Pa.), is producing large metal single crystals of copper for use in neutron spectrometers. Although such crystals have been widely used in semiconductor applications, they reportedly were not of the quality necessary for neutron spectrometry.

•

Isophthalic Acids: Alliance Chemical Corp. (Newark, N.J.) has started production of three chemicals: 5-sulfoisophthalic acid; 5-hydroxyisophthalic acid and dichlorodianisidine.

LITERATURE

• The Instrument Society of America (Pittsburgh), under a grant-in-aid from the National Science Foundation (Washington, D.C.), is currently publishing English translations of '61 issues of four Russian technical journals. The ISA's "Soviet Instrumentation and Control Translation Series" is now in its fifth year. The journals are "Automation and Remote Control," "Measurement Techniques," "Instruments and Experimental Techniques" and "Industrial Laboratory."

• Charles Lowry and Seaton Preston, publishers of gas chromatography abstracting service and instrumentation abstracts, have formed a partnership—the Lowry-Preston Technical Abstracts Co. (914 Chicago Ave., Evanston, Ill.).

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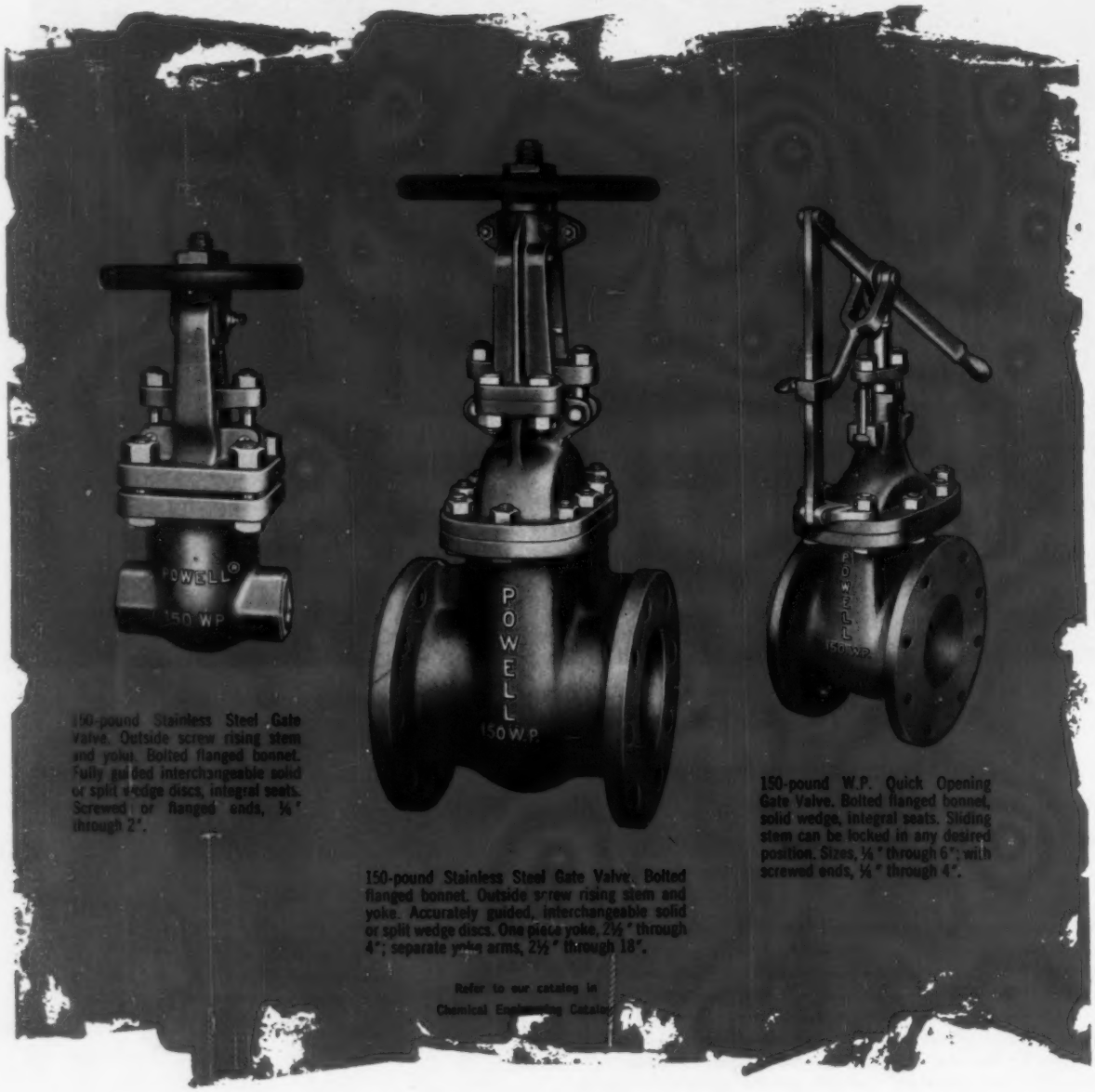

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Long after a nuclear blast cloud is dissipated, radioactive fallout lingers in the air, in water and on the soil. It can affect chemical processes. Here's what the U.S. CPI is doing to counter it.

No Furor over Fallout

Much of the fuss stirred up by the recent Soviet nuclear tests is subsiding. But concern over the effects of increased radioactive fallout will continue for many months as heavy winter snows and rains deposit radioactive debris on the ground and in water supplies. And chemical process industries plants are faced with a nebulous, but potentially prickly, poser: What steps, if any, should be taken to prevent process and product fouling and contamination?

While most chemical companies insist that fallout can cause no process problems, some have been forced to take active measures to guard processes. Others, while expressing no concern, are wary—if not worried—because they admit they don't know whether or not they have a problem. Few companies are willing to discuss the subject in detail, if at all, because they are afraid of "scare reaction."

This includes the companies that admit to problems. Photographic film producers and their suppliers of raw and packaging materials, for example, have wrestled with the fallout problem since the time of earlier nuclear tests. Radioactive contaminants that are on a dust particle within a photographic emulsion produce exposed spots (the same amount of radioactivity distributed homogeneously throughout the emulsion will seldom cause a problem).

Although film producers don't discuss the amount of radioactive contamination that can be tolerated, a clue to permissible dosage turns up in another way. In research where photographic film is used to measure the amount of radioactivity in a source material, it has been found that most film must get about 10^7 beta particle disintegrations/square centimeter to record activity.

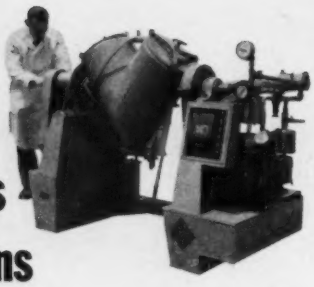
Some firms—e.g., Du Pont and Eastman Kodak—have set up safeguards said to be effective against fallout for the foreseeable future. Air and water (where necessary) are filtered, workers shoes are washed and their clothing changed. All incoming raw and packaging materials (e.g., cellulose acetate and paper) are monitored. Suppliers also monitor their raw materials and finished goods.

First Step—Monitor: In addition to photographic film producers and suppliers, the makers of sodium iodide crystals for radiation detectors safeguard their materials from contamination. And the makers of glass for multiplier phototubes with sodium iodide phosphors, used in whole-body-counting systems, worked with the Atomic Energy Commission to develop low-activity glass.

However, most process industries companies feel that present fallout radiation levels are too low to require protective measures.

Monsanto points out that in its processing of food phosphates, feed additives and plastics, there are instances where the process tends to eliminate even chance contamination. For example, iodine-131 won't get through the electric furnace operation to cause contamination of elemental phosphorus.

Reason for Caution: Iodine-131, of course, with half life of eight days, is just one of the problem elements. Strontium-89 (half life, 53 days) and strontium-90 (27 years), cesium-



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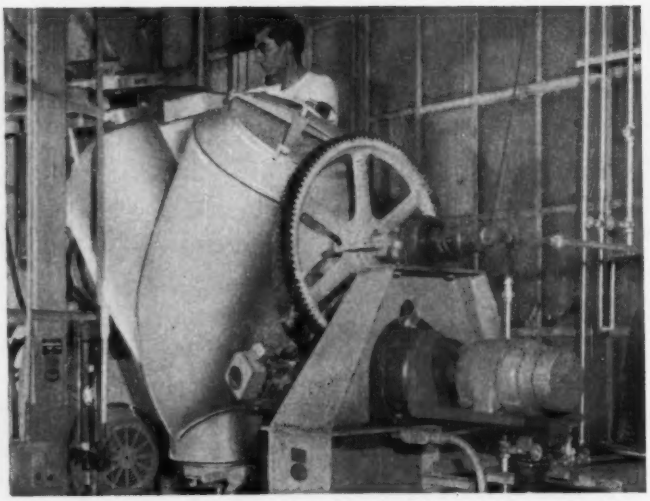

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137 (27 years) also present problems. So firms are still cautious. For example, Procter & Gamble says, "While we feel that current levels of radioactivity present no problems to our manufacturing processes, we are conducting studies in this area. We have reached no conclusions yet."

Reason for wariness: many companies are on unfamiliar ground. Most companies are depending on governmental agencies to provide cues to action. Some have staff radiochemists, but they generally aren't concerned about fallout radiation levels from a processing standpoint. A radiochemist at Abbott Laboratories points out that it is the long range, cumulative effect on biological and genetic reactions in humans and plants that is the worry.

However, radiochemists have shown some concern over the radioactive contamination of materials used in their research. Under the direction of W. Wayne Meinke, chairman of the National Research Council's subcommittee on radiochemistry, James R. DeVoe of the University of Michigan spent one and a half years researching the problem. His report (Publication 895 of National Academy of Sciences-National Research Council, Washington, D.C.), published earlier this year, pinpoints the problem and offers clues to process industries firms for study.

DeVoe explains that the levels of radioactivity discovered in manufacturers' reagent chemicals, metals used for shielding, etc., are now well below the levels considered as a health hazard by the U.S. Public Health Service and the Atomic Energy Commission. But in a few cases, the low-level radioactivity can create problems to researchers. For example, krypton gas has now been radioisotopically contaminated with Kr^{85} to the extent that it is no longer usable as a carrier gas for certain applications (e.g., as a counter gas in a low-background radiation detector).

Reference Point: NRC's subcommittee on radiochemistry pointed out in the report that some sort of standards for radioactivity should be established for various chemical elements. The National Bureau of Standards, which was suggested as the logical agency, is now considering the recommendations.

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ADVERTISING STAFF

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Chicago 11 ..... Alfred D. Becker, Jr., R. J. Claussen, 645 N. Michigan Ave., MOhawk 4-5800

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Franfurt/Main ..... Stanley Kimes
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2 Place du Port, Geneva, Switz.

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London W1 ..... E. E. Schirmer, N. Murphy
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procedures for low-level activity measurements is already being pushed by instrument makers. General Measurements Division of Precision Scientific Co. (Garnerville, N.Y.) has just developed a monitor for liquids, solids and air which it claims is 1,000 times more sensitive than sodium-iodide crystal techniques, costs $15,000-22,000. The first unit, for liquid monitoring, has been placed in service on an Eastern city's water supply. It measures a continuous flow, gives readings of activity as low as 10 micromicrocuries/liter in three minutes with 95% reliability. Units provide printed typewriter readout.

General Measurements' Frank Domingus predicts immediate markets in milk processing for strontium-90 monitoring, sewage disposal where contamination may affect bacteriological decomposition and in tobacco and cigarette-paper processing in addition to water-supply monitoring.

In general, companies which draw water from underground sources have no problem with radioactivity—the soil serves as an ion-exchange unit. The Permutit Division of Pfaudler Permutit, which last week unveiled an ion-exchange unit for fallout shelters, says that some firms now use satisfactory water-purification techniques (for electronic, high-pressure boiler, chemical washing and similar applications). These techniques, which combine coagulation, chlorination, filtration, adsorption through activated carbon and mixed-bed ion exchange, result in 99% reduction in any contamination level.

In air filtration, Research-Cottrell points out that although improvements in disposal techniques are desirable, many types of dry filters will remove contamination.

Under present low-level fallout conditions, firms that find relatively high contamination levels can store some materials for a period of a few weeks and expect reductions in contamination level as a result of short-life iodine-131. At least one papermaker, which supplies to photographic film producers, merely produces for other users on days when monitoring shows contamination to be high.

To chemical process industries companies that have not yet faced product damage, this knowledge that fallout can be licked is of considerable encouragement.

Tracers

TO THE CHEMICAL PROCESS INDUSTRIES

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CHEMICALS WANTED

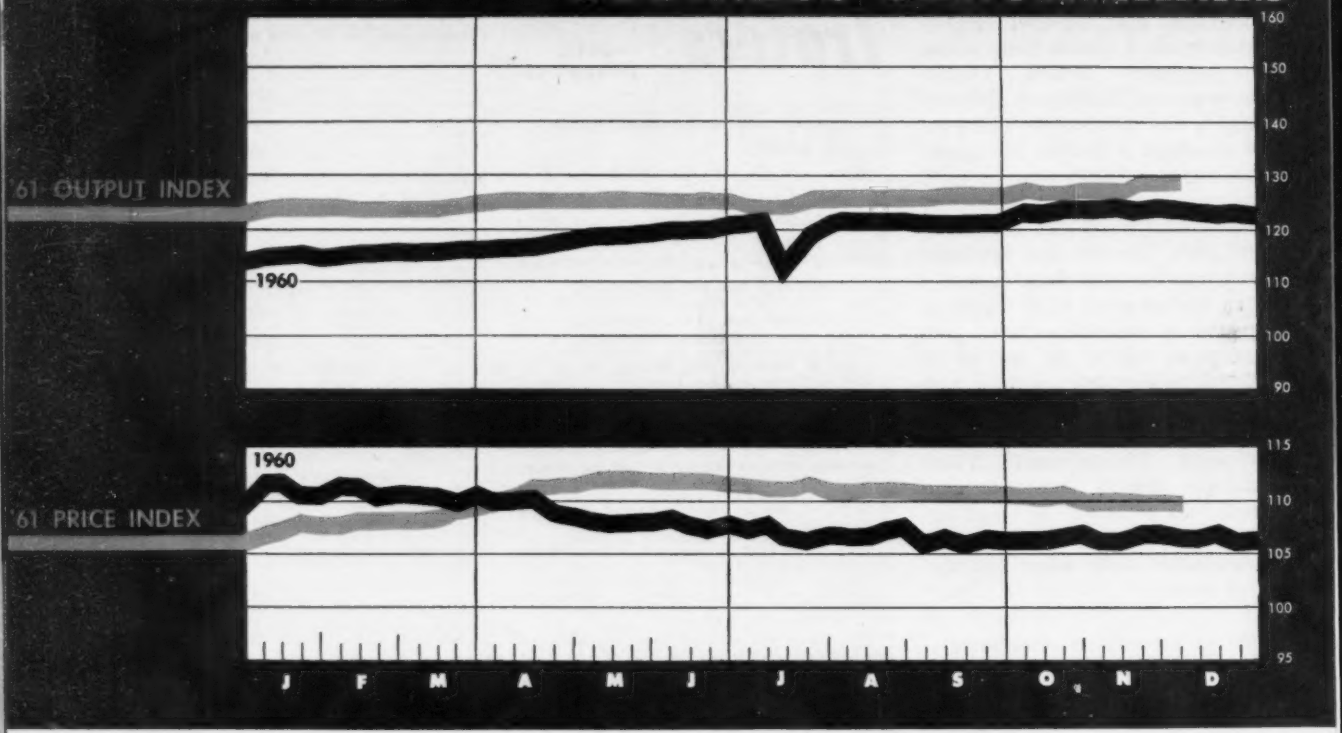
Bleach Wanted-Full commercial strength, tank wagon quantities. Quote delivery and price to C. Morris c/o Clarkson Laboratories, Inc., 1450 Ferry Ave., Camden 4 N. J.

MISCELLANEOUS

To Employers Who Advertise for Men: The letters you receive in answer to your advertisements are submitted by each of the applicants with the hope of securing the position offered. When there are many applicants it frequently happens that the only letters acknowledged are those of promising candidates. (Others do not receive the slightest indication that their letters have even been received much less given any consideration.) These men often become discouraged, will not respond to future advertisements and sometimes even question if they are bona fide. We can guarantee that Every Advertisement Printed Is Duly Authorized. Now won't you help keep our readers interested in this advertising by acknowledging every application received, even if you only return the letters of unsuccessful applicants to them marked say, "Position filled, thank you." If you don't care to reveal your identity, mail them in plain envelopes. We suggest this in a spirit of helpful co-operation between employers and the men replying to Positions Vacant advertisements, Classified Advertising Division, McGraw-Hill Publishing Company. "Put Yourself in the place of the Other Fellow."

This Tracer Section can be used whenever you are looking for or offering Equipment, Plants Supplies, Chemicals, Opportunities, Special Services. The rates are low—just call or write Classified Advertising Division. Chemical Week, P.O. Box 12, N. Y. 36, N. Y., LOngacre 4-3000.

BUSINESS BENCHMARKS



DECEMBER 2, 1961

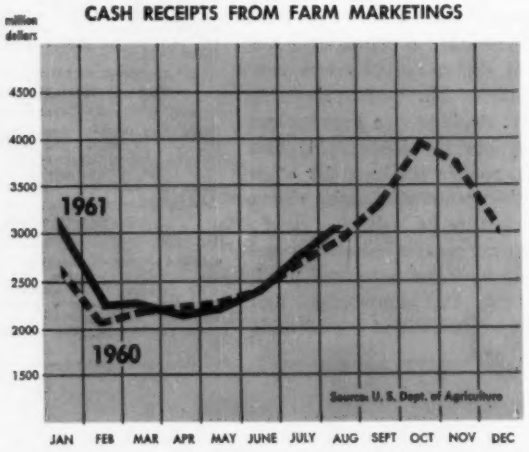
WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	127.5	127.3	125.0
Chemical Week wholesale price index (1947=100)	109.2	109.4	107.0
Stock price index (12 firms, Standard & Poor's)	55.80	56.69	48.13
Steel ingot output (thousand tons)	2,037	2,046	1,470
Electric power (million kilowatt-hours)	15,678	15,520	14,435
Crude oil and condensate (daily av., thousand bbls.)	7,206	7,178	6,968

PRODUCTION INDICATORS (1957=100, unadjusted)	Latest Month	Preceding Month	Year Ago
All manufacturing	117	113	110
Nondurable goods manufacturing	125	122	119
Durable goods manufacturing	111	106	103
Chemicals and allied products	130	131	121
Industrial chemicals	139	133	126
Petroleum and coal products	113	113	109

CHEMICAL CUSTOMERS CLOSE-UP

MANUFACTURERS' SALES OF PLASTICS

CASH RECEIPTS FROM FARM MARKETINGS



WE'VE BROUGHT CLEOPATRA'S BARGE UP TO DATE

In our picture, you'll notice Cleo's eyes are quite wide. They should be, for we've loaded her barge with a few thousand things she never heard of... but which modern industry is producing from Sinclair petrochemicals.

For example, in the plastics and synthetic fibres industries Sinclair petrochemicals are indispensable raw materials being used in the development of countless new and exciting products. Even when you add the new developments in paints, fertilizers, insecticides and detergents, you've only scratched the surface of profitable opportunities.

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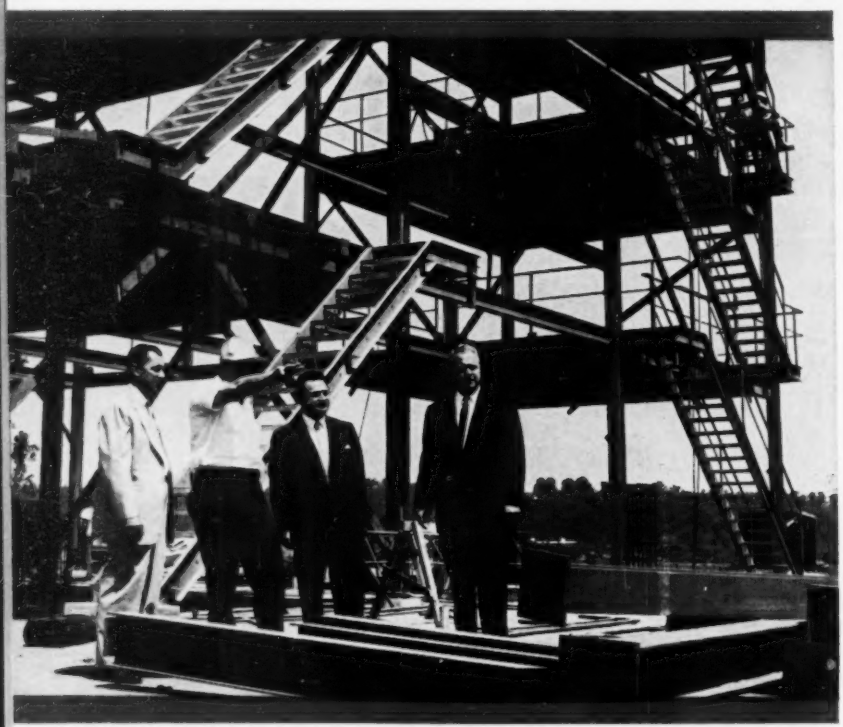
Olin

commercializing own new glycerol process

SCIENTIFIC DESIGN

engineers and constructs plant from pilot data

Construction of Olin's new glycerol plant is viewed by C. Jack Thomas, Director of Production at the Doe Run Plant; Dean Whaley, Construction Superintendent of SD Plants Inc.; G. A. Siegelman, Vice President - Production of Olin's Organic Division; and D. J. C. Copps, Corporate Vice President and General Manager of the Organic Division.



Olin will enter the synthetic glycerol market with its own newly developed process. The practicality of the process, which has been fully piloted by the company, will result in a manufacturing cost that will insure Olin of a strong competitive position, with a product of high purity suitable for all applications.

Olin selected Scientific Design, a company with a unique background of organic chemical process technology, to design, engineer and construct a 40 million lb. per year glycerol plant—the first to use the new process. SD has amassed a vast wealth of chemical know-how through development of its own and third party processes, and through the scaling-up of these processes into commercially successful organic and petrochemical plants throughout the world.

The Olin synthetic glycerol plant is now under construction at Brandenburg, Kentucky, and will be placed on stream early next year.

You, too, can profit by putting SD's broad chemical engineering experience to work for you when planning your next plant.

SCIENTIFIC DESIGN COMPANY, INC.

EXECUTIVE OFFICES: TWO PARK AVENUE, NEW YORK 16, NEW YORK

International Leader in Development, Design and Construction of Chemical Plants

SD-206